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THE MOUNT RITTER GROUP FROM MOUNT LYELL.

APPALACHIA.

VOL. VII. BOSTON, FEBRUARY, 1893.

No. 1.

An Ascent of Mt. Ritter.

BY JOSEPH LE CONTE, JR.

Read February 8, 1893.

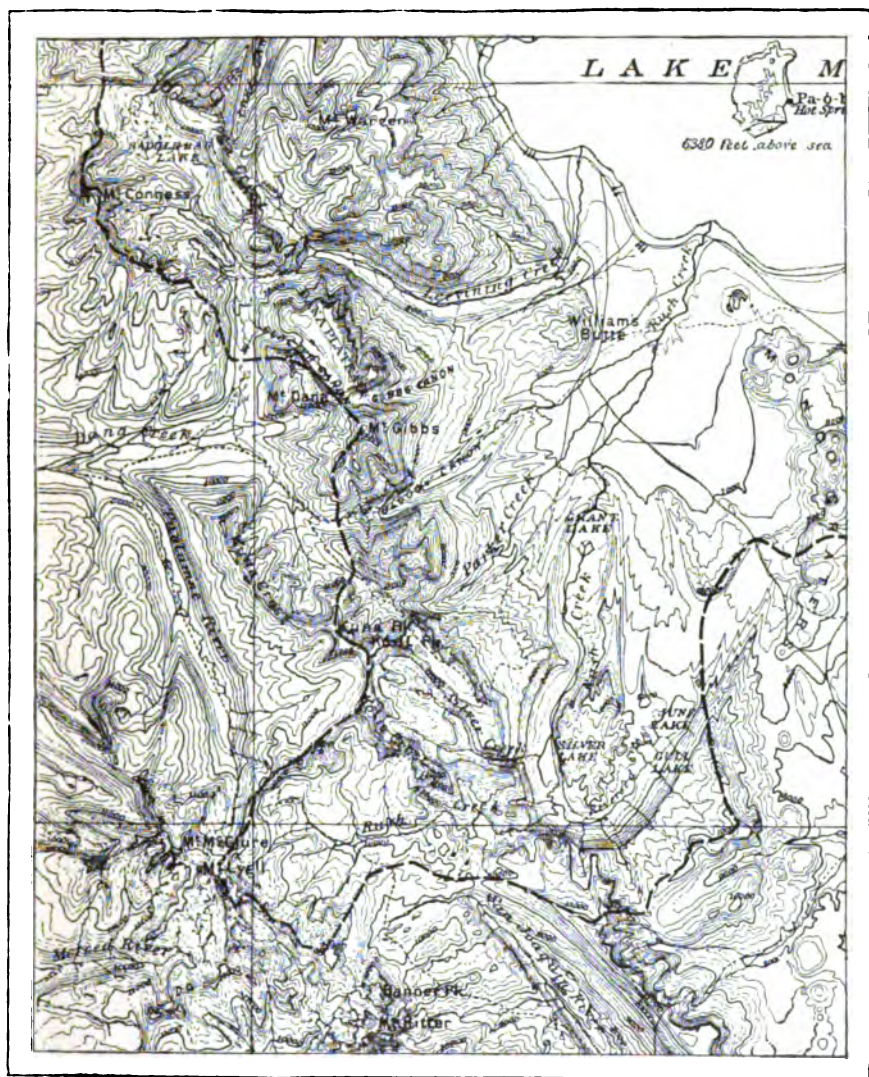
THE rugged pile of snow-clad mountains lying to the east of the Yosemite Valley, and embracing the groups of Mt. Lyell and Mt. Ritter, is, in many respects, the most magnificent portion of the Sierra Nevada. For a distance of ten miles this mountain mass lies along the axis of the range, and in its rocky fastnesses four of the principal streams of this part of the State find their sources. At the northern extremity Mt. Lyell is the dominating point, lifting its glacier-crowned summit 13,040 feet above the sea. This mountain is readily accessible from the Tuolumne Meadows at its base, and is frequently ascended from this side every summer by the more adventurous visitors to the Yosemite Valley. To the south rises Mt. Ritter, towering above an almost inaccessible wilderness of cañons and amphitheatres about its base.

As viewed from the summit of Mt. Lyell, this peak presents a most imposing spectacle; and ever since I first viewed it from this point in the summer of 1889, it had been my greatest desire to reach the summit of this savage-looking old giant. The summers of 1890 and 1891 were spent elsewhere in the Sierras; but in the spring of 1892 my friend Mr. Hubert Dyer arranged a trip with me, with the sole purpose in view of attaining the summit of Mt. Ritter. Mr. Dyer had but two weeks at his disposal; so we hurried across

the plains and foothills toward the Yosemite Valley, from which place the real trip was to begin. Imagine our disappointment, when, on reaching the Valley, my friend found a letter awaiting him, calling him home on important business. I determined, however, to remain in the Yosemite some weeks, and enjoy the many interesting climbs about this world-renowned spot. Three weeks were spent in the Valley and vicinity before I made the acquaintance of two gentlemen, Mr. Theodore Solomons and Mr. Sidney Peixotto of San Francisco, who agreed to join me on my proposed trip to Mt. Ritter. Arrangements were speedily made. All our provisions and small cooking-outfit were packed on my little donkey "Jingle," while my friends took along their saddlemules, which, beside carrying their bedding, could be used for riding if any one so desired.

On the morning of the 23d of July we left the Yosemite by way of the Clouds' Rest trail, and began our march toward the High Sierras. As we climbed the tremendous slopes of the Merced Cañon, we had constantly in view the grand assemblage of the Mt. Lyell group, and all the spires and pinnacles along the range. By night we reached the base of the Cathedral Peak, and camped in one of those rich meadows which abound in all the higher portions of the Sierras. The next morning we followed the Tuolumne River to its source, pushing up the northern slopes of Mt. Lyell, till only about two miles below the point where the river issues from beneath the glacier, and on the bank of this thundering mountain torrent made our second camp at about ten thousand feet above the sea.

So far the route was plain and well known, I myself having been over it several times before; but ahead of us was a region without trails into which none of us had ever been, and from now on the trouble with our animals was to begin. From my recollection of the country as viewed from the summit of Mt. Lyell, I knew that the main crest connecting that mountain with Mt. Ritter, six miles to the south, was absolutely inaccessible, for it was made up of a succession of towers and pinnacles, and flanked by cliffs thousands of feet high. Our plan was then to cross the crest of the range by



a pass to the east, continue toward the south along the eastern slope, and cross back again when opposite Mt. Ritter. Whether or not we could get our animals across the ridge could be learned by trial only; but we had determined that if unsuccessful, we would leave them behind, and strike out without them.

In the morning we were up by the earliest dawn, and were treated to the glorious view of the rosy sunrise light upon the Mt. Lyell glacier. By 7 A.M. we had reached the base of the ridge, and now began to pick a way for our animals up the slope. From the crest above, long piles of talus streamed down the mountain-side, and bluffs and ravines continually crossed our course; but, by good luck, we always found a way past these obstacles, and by nine o'clock the worst was over, the slope became less sheer, and finally we walked out upon the barren, rocky crest at an elevation of about eleven thousand feet.

Hitherto we had not obtained a sight of our mountain, not even the highest crag had shown itself to our eager eyes; but now the whole magnificent view of the Ritter group burst upon us. I doubt if anywhere in the Sierras there can be found a peak of such dark, savage grandeur, rising so prominently above all its neighbors. It has well been called the "King of the California Alps." From that time on this snow-streaked summit held our attention. Whether struggling with the exasperating stupidity of the mulish mind in descending slopes or crossing streams, or eating our hard fare of flapjacks and mush at noon, our eyes were continually turning toward the goal of our journey.

Most of the day was spent in crossing the broad undulations of the Rush Creek Basin; by evening we reached its southern rim, and once more stood upon the main crest of the range directly in front of the mountain. About two hundred feet below us lay a large lake dotted with islands. Its upper end, surrounded with soft, green meadow, furnished an ideal place for a camp; so we quickly descended to its margin, and spent the remaining hour of daylight in gathering wood for our campfire, cooking supper, and getting ready for our climb the next morning.

Ritter is really a double-crested mountain,¹ the higher of the two crests (Mt. Ritter proper) lying about a mile to the south of the minor summit, called by members of the United States Geological Survey "Banner Peak." It was at the base of this latter that we were camped, and the stream which flowed by our camp into the lake headed upon its flanks. Up this our route lay as we set out the next morning, — first through velvety meadows and miserably stunted pines; then, leaving the last vestige of life behind, we advanced upon the broken piles of debris of Banner Peak. Slowly we toiled upward over this uncertain footing, the boulders growing smaller and looser as we approached the base of the cliffs, giving place finally to patches and then to great fields of snow, which furnished a relief from the yielding nature of the sliding stones. In a couple of hours we reached the head of our creek, and quickly climbed over the last stretch to the top of the first ridge. We were now directly in front of the main peak of Mt. Ritter. Down from the saddle between the two summits swept the northwest glacier, filling the rocky gorge below us, and terminating in a large lake covered with miniature icebergs. Flanking the whole of the opposite side rose an unbroken line of cliffs varying in height from five hundred to a thousand feet, arranged in a singularly uninviting array; and above these, a clear thousand feet higher, the summit itself stood out in bold relief against the dark blue sky.

We saw at a glance that the only possible route lay up the glacier, and that then at some point that cliff must be climbed, or else there was no Mt. Ritter for us that day. We had already consumed more time than we should have done in reaching this point; so we now set out at our best pace to skirt the western spurs of Banner Peak and gain the surface of the glacier. The cliff on the glacier's western edge continued as an absolutely vertical wall as we advanced upon the hard-frozen surface of the snow-field, furnishing no possible means of ascent, excepting at the very summit of the

¹ In the frontispiece (Plate I.) Mt. Ritter is the lofty peak to the left of the centre of the plate, with Banner Peak on its left. Mr. Le Conte's route from the col to the summit may in general be followed with the picture before one, though the great distance involves the loss of detail. — Ed.

saddle, where a long tongue of snow leaned up against its front. Above this a rugged gully continued to the top of the wall. Toward this we now directed our steps; but the slope of the snow grew more and more excessive as we advanced, till it became a most difficult matter to maintain a foothold upon its surface. Solomons took the lead, kicking steps in the névé, and Peixotto and I followed in his tracks. Finally I proposed that we take to the rocks at a point a hundred yards to the right of the snow tongue, and rather risk our chances at climbing the cliff than of sliding down the glacier. Accordingly we bore off in a horizontal direction, and soon laid hold of the rocks with a feeling of relief.

After resting a few minutes, we started upward again. From the first the climbing was dangerous in the extreme; but we crawled cautiously upward, taking advantage of every crack and projection in the wall. Several times our way seemed completely blocked; but again some practicable route would open up, till at length, after some three hundred feet of this had been overcome, we were brought to a halt by an absolutely sheer wall, and could go no farther in that direction. So we all three sat down on that narrow ledge, and revolved the situation in our minds. To retreat down the cliff would be to give up the climb for that day; besides, it was not at all probable that we could get down, for one may climb upward in comparative safety over places where it would be impossible to descend. Indeed, a look down upon the glacier below suggested such extremely disagreeable possibilities to my mind, that I started off along a ledge to the left, and by dint of hard climbing, clinging close in against a projecting crag, I got to the next ledge above. Calling to those below that there were still prospects of a way up, I received from them the bag of lunch and the little camera, and, standing to one side, allowed the others to come up. Still on we pushed, every step making the return less possible, and after an hour and a half from the glacier we stood at the top of the wall, five hundred feet above the snow.

The western slope of the mountain, upon which we now looked, was frightfully gashed by deep gorges, and between these the huge rock masses were piled up in indescribable con-

fusion; but there was no more dangerous work to be done, and with a feeling of exultation we saw that the summit was ours. An hour more, picking our way through the maze of gulches and pinnacles, and we were on the shattered summit, 13,072 feet above the sea. How I wish I could give an idea of the magnificence of the view which we beheld, and of the rugged grandeur of the mountain itself! This would be entirely beyond my power; so I can only name some of the principal points in sight.

To the south stretches out in a perfect wilderness the main crest of the Sierra Nevada, — a sea of snowy peaks extending as far as the eye can reach. We could distinctly see the Palisades, and farther on the giant peaks about the sources of the King's and Kern Rivers. To the east, 7,000 feet below, is Mono Lake, and the sterile desert plains of the Great Basin, crossed with innumerable chains of barren mountains. To the north, towering to the very sky, rise the magnificent peak of Mt. Lyell and all the spires along the intervening range. The southern slope of this mountain presents a strikingly different view from the northern. One would hardly recognize in this bold castellated crag that graceful snow-capped summit. To the west are the rolling country and deep cañons of the various forks of the San Joaquin River; while to the northwest lies the Merced group, which is so prominent and beautiful an object from all points about the Yosemite. Upon the flanks of the mountain on which we stood, five small glaciers lie nestled in deep cañons. Clustered about its base are innumerable lakelets, of exquisite blue, which form the head-waters of the San Joaquin.

Upon the summit we found a rough monument of stones, containing one record, — that of Willard D. Johnson and John Miller of the United States Geological Survey, who visited the mountain nine years before. Since that time no human being had placed foot upon its crest. Certainly, if the people of this country, or even those of this State who live within sight of these snow-capped summits, only realized the wonders of the High Sierras, there would be fewer going abroad in search of mountain scenery.

For three hours we remained on the summit, and during

that time none of us could feel quite at ease, for it was certain we should have to look for a new way to return. About 2 P. M. we prepared for the descent. When we first climbed to the top of the cliff above the glacier, we had determined to return down the opposite side of that ridge; but from our position on the summit we saw bad cliffs toward its lower end, which would certainly obstruct our way. Down the northwest face was a precipitous gorge leading toward the foot of the glacier; we decided to attempt the descent along its bed. For several hundred feet the way proved easy, but soon we came to drops of many feet at a time,—huge steps in the creek bed,—and at length, after a thousand feet of such descent, we saw that the lower end of the cañon was nearly vertical and utterly inaccessible; neither could we climb out of the sides, for they rose in vertical cliffs a hundred feet high. Accordingly we were forced to retrace our steps. Finally we escaped from the gorge on the east side, and started toward the route we had first chosen, only to find our way blocked by another cañon,—an immense groove in the mountain side. So far as we could see downward, our side presented an unbroken wall; so we were again obliged to climb upward to get around its head. This brought us again within a few hundred feet of the summit of the mountain, and we now followed our morning's route back to the cliff up which we had climbed.

It was now 4.30 P. M. Two hours and a half had been utterly wasted, and no way down the mountain had yet been found; so we had a choice between a night out at an elevation of 12,500 feet without fire, blankets, or food, and another trial at that precipitous cliff. While discussing these pleasing alternatives, Solomons said he believed he saw a practicable route at a point farther up the slope. I started to explore. By the best sort of luck I found a series of ledges which led clear down to a snow-tongue of the glacier. I raised a shout, and the others followed; and there on the edge of the upper crevasse we all shook hands over the happy ending of a bad scrape.

We had still to get down the fearfully steep front of the glacier; but we knew that time and patience would conquer

that; so we started down in a sitting posture, kicking steps with our heels in the dense snow. When part-way down Solomons slipped and shot like an arrow to the level parts below, luckily without any other injury than cutting his hands on the sharp ice-blades. Arrived at last in the saddle between Mt. Ritter and Banner Peak, we turned to look back at our course, and saw that the snow-tongue which we had just descended was none other than the one at which we were aiming in the morning, but which we had abandoned on account of the steepness of the snow. We made our way without further trouble over the uneven surface of the snow, around the outlying spurs of Banner Peak, and soon saw below us the island-dotted lake at whose head we were encamped. We sprang upon the piles of debris, jumping from block to block, never stopping long enough to lose our balance, and at last came upon the meadows at camp at 7.40 P. M.

As I lay warmly rolled in my blankets that night and heard the wind sweeping over the desolate range, I felt extremely thankful that I was not out on the slopes of Mt. Ritter.

The Brook Path to Chocorua.

BY JOHN COLEMAN ADAMS.

Read November 9, 1892.

It is perhaps unnecessary to go over the story of how the brook path came to be cut. It is less a tale of mountains than of society, being a narrative of the progress of a monopoly to its own overthrow. Suffice it to say that the outcome of all the trouble was that the farmers of the neighborhood, being denied free passage by the existing path to the blueberry-bushes on the mountain, rallied in force and in a couple of days' labor with the axe cleared a new path along the line of Claybank Brook, and opened to the world the loveliest way up Chocorua, as well as one of the most attractive wood-walks in all the White Mountains. Once more was found an illustration of that ancient truth which proclaims that the wrath of man works praise at last.

The lingering clouds on the northern edge of the great August storm were still hovering to the southward, and the day hung a little uncertainly between cloudy and clear as we wound along the Fowler's Mills road toward the mountain's base. Few mountains have a more delightful approach than is made by the road from Tamworth to Chocorua. As one turns out of the village, the peak is seen in all its relations to the range and to the surrounding country. When the road leads under hills and into woods which hide the mountain, one still gets occasional glimpses of the peak, maintaining in its own peculiar fashion a constant oversight upon the spectator. Few mountains have such a way of peeping at the traveller around its base from over the foothills or the tree-tops. As one draws up toward the base of the mountain, there is a transformation of surroundings, and Chocorua stands out again in bold relief, its outlines and its details appearing in great distinctness, as if to impress upon the mind of him who approaches its fastnesses the character of the work before him. Much of this approach, too, is made delightful by the music of Swift River, along whose side the road runs for many miles, and whose reaches offer delicious vistas of overhanging birches and maples and spruces; climbing clematis and prostrate tree-trunks line the banks, between which the clear waters flow over gray and golden sands; and over all the light plays a constant chromatic scale, marvellous in brilliancy and range.

About half a mile from the Durell farmhouse, — where we left our horse to ruminate all day in the draughty barn, — the path forks, and the new way bears to the left, in order to round the southwesterly end of the spur which divides the ravine in which lie Liberty's Camp and path, from the ravine of the Claybank Brook and the new path. The path here is a capital wood-road, and indeed, if it were desired to spare fatigue to ladies or less sturdy walkers, it is possible to drive upon it a mile or more beyond Durell's. Presently it bears away to the right, and the ear is greeted by that jocund sound, the most sociable in all the woods, which signals the procession of the mountain waters on their perpetual march to the sea. The rains of the preceding week had filled all

the streams to their full capacity, and this one of ours was almost shouting in the fulness of its strength and exuberance. As soon as we came within sight of its sliding waters, we knew that we had come upon a very arcanum of sylvan beauty, the trysting-place of the waters and the trees, dear to the shy retiring trout, dear to his friendly foe the fisherman, but dearer yet to pure lovers of pure Nature, who delight in what charms disclose themselves in the forest deeps, "under the greenwood tree" and "beside all waters." Especially picturesque is the brook just before the path crosses it by the little corduroy bridge. The foreground is filled with dark boulders splotted with gray and brown, planted in deep pools or swept by foaming sheets and tumbling rapids; branches, twigs, and leaves, matted and twisted together, clog the narrow sluiceways between the rocks, — the debris of spring freshets, stranded till the next high water; and the eye runs, where the feet would like to follow, from stone to stone backward up the defile between the tall maples and birches, with intermingling basswood, goose-maple, and hobble-bushes, till the stream loses itself in the crowding trees up the ravine.

For half a mile beyond the corduroy bridge the wood-road continues over an easy grade, just under a ridge which makes the northwestern wall of the ravine. Then descending to the brook-side again, the path crosses on stepping-stones and, climbing a rather steep incline, plunges into thicker woods and takes a sharper pitch upward. The beauties and the pleasures of the path grow thicker and more intense. The winding way has been well bushed out, and it is as distinct as possible with fresh and frequent blazes; so that all the attention may be given to the enjoyment of the charm of the deep forest.

I suppose that the connoisseurs and the gourmands of forest pleasures would give the first place in the catalogue of its delights to the silence of its deepest fastnesses; and I recall that upon this very climb one of our party made certain strictures upon the voice of the brook, which follows one for three good miles up the ravine. He thought it intrusive, or at the best good only as an interlude, and not to

be compared for enjoyment with the profound silence which it broke. But I plead for the voice of the waters. There is something in the sound of a mountain brook,—at least so long as it does not swell to the hoarseness of a torrent,—which breaks the forest silences only to accentuate them, and falls upon the ear with a touch like that of the leaf as it drops upon the forest floor. This Claybank Brook is an element in the new way up Chocorua which shortens it one half. Its voice is at once a stimulant to the energies and a solace for fatigue. It is perpetually calling the wayfarer up higher, and while he clammers it charms away all sense of weariness. He walks beside it for a while before the path recedes up the side of the ravine and into the forest, and the sound of the stream is low. Then it comes up from the depths of the gully, and announces its continued presence. Presently you see it again as it drops down a series of cascades, divided, united again, widening and narrowing by turns; and whenever it reappears its tuneful noise swells in a delicious crescendo which blends perfectly with the whispering in the hemlocks, the chattering of the remonstrant squirrel, or the creaking of boughs which overlies one another. This brisk and loquacious brook sings a cheery and an inspiring song for two thirds of the climb to the open ledges of Chocorua. If it seem in any way to suggest society, companionships, the worldly hubbub from which one is fleeing, it is only by the remotest intimations. Its real affinities are with the rush of the wind, and the presence of the wild things that come to its edge to drink.

It is with the music of the brook in one's ears, deep down in the ravine and out of all sight, that one turns a corner in the path, and catches a glimpse of the peak of Chocorua, which arrests him to let it sink into his sight and memory. Let nobody fail to halt at this point, and get the most perfect near view of the great stone cone. A stump of some old pine or hemlock with a natural fernery in its core, a stump full three feet across, stands beside the path on the left, and a rude arrow is blazed on the tree opposite. Go two rods to the left, and you see the gray cone lifted in its most symmetrical shape against the sky, with all the depth of the

ravine up which you look giving height and dignity to the great mass above. It is a unique view of the unique summit. Seen as we saw it later in the day, with the western sun shining full upon it, it was the embodiment of serene stability and of stable serenity. If one could go no farther in the path, this glimpse is ample compensation for a half day's work.

From this point on for at least a mile, the path is one continuous line of delights. The forest is thick, mature, and dignified. It has many a lofty trunk, which the woodman must have spared for two or three score years. It is unusually clear of thick and impeding underbrush; and best of all, it has a carpet of moss and mould, elastic, deep, refreshing to the tread. It is usual, I suppose, for purely sensuous enjoyments to shade down into carnalities; but I hold that there are certain ones which rise very nearly to the purely spiritual. To tramp over such a forest path, a road-bed of deep wood mould, comes as near to an absolutely spiritual experience as one ever gets through the medium of the nerves and muscles. The feet sink in so unhindered, they are checked so gently, they are so assisted in their forward push by the springing soil, that walking becomes a species of rest, and climbing is easier than sitting still.

We were still treading on this incomparable footing when the sound of the waters died away, the path pitched steeply up hill, and we scrambled through the perfect silence of the innermost forest. How rich is the memory of those passing moments in the hush of the woods! It was an ineffable refreshment, a cordial more healing than all the balsam of the firs and the pines, distilled into a potion. It is no wonder that wise doctors send certain classes of patients to the woods for cure; though I am not sure that the credit for the restoration always goes where it belongs. There is an immense though unrecognized therapeutic quality in this deep silence of the forest and the absolute rest it gives to the ear, the slackening of all tension on the auditory nerve, the cessation of all the noises which attack and exhaust the brain in the rush and confusion of daily life. I suspect that a good many people whose illnesses are set down to other causes are simply suffering from the din and racket of modern life.

Those insidious diseases which are arraigned under the name of nervous prostration, neuresthenia, and the like, are often only wearing shrewd and scientific aliases; and the people whom they cripple and slay are simply dying of too much noise.

There is but one really sharp scramble, perhaps ten minutes long to a fairly good climber, before one emerges from the woods at the head of the ravine and comes out upon the ledges, more or less open. Up to this point the climb is as easy as by any of the various paths up Chocorua, and by all odds the most picturesque of them all. The forest is finer than any along Liberty's path; and the brook, besides the æsthetic charm we have emphasized, offers its more material comfort to the ever-thirsty climber. Once above the forest line and on the desolate ledges, the work becomes a little more exacting, until the little plateau is reached where the old path emerges from the "Chimney." But if one has to pause frequently in this last half-hour's pull, great is his solace in the halts; for the view now opened to him is almost as extensive as that which he gets from the summit. From Lake Sebago on the east around to the Franconia mountains and Mt. Carrigain to the northwest, the eye sweeps through the whole gamut of New Hampshire landscape,—lowlands and mountains, forest and farm, placid lake and rugged ledges; and towering above, an ever-renewed challenge to his powers, looms the bared brow of Chocorua itself, bright with the promise of the finest "all around" view in the whole range. When at length we halted beside the two cool and transparent springs which well up at the foot of the last lift of the summit ledges, to eat our lunch and flash our signals back to Tamworth, it was the unanimous vote of the party—Appalachian experts, amateur of photography, and chronicler of the expedition—that Nat Berry and his neighbors had conferred a lasting favor upon the lovers of Chocorua in opening up the Claybank Brook and its tributary ravine,—a clear and easy path that may well win the suffrages of all who come to the mountain from the Tamworth and Sandwich side, as yielding the maximum enjoyment for the day's work.

Up Tripyramid on Snow-Shoes.

BY ISAAC Y. CHUBBUCK.

Read March 9, 1892.

THE morning of the 22d of February, 1892, was not very promising to the members of the Snow-Shoe Section sojourning at Waterville, N. H. The mountains were capped, clouds floated around, the snow was soft, and a feeling of spring was in the air. But the bulletin announced that the party would leave the house at 10 A. M. for a walk to "Beckytown," and, for those who desired, a longer trip to "the V."

At the appointed time a large party, in Indian file, started up the hill and into the woods, taking the path leading to the cascades. This part of the walk was a pleasant ramble, as we had traversed it several times and the snow was well packed. Signs of animal life were more abundant than on previous days. Tracks of rabbit, squirrel, and ruffed-grouse crossed our path in every direction, showing that there had been a lively skirmish for an early breakfast by the forest denizens. I sighted a rabbit as he disappeared into the end of a hollow log, and I heard the notes of several kinds of birds. On either side of the path the hobble-bush (*Viburnum lantanoides*) was waiting for early spring. New shoots clad in rich russet hue, bearing the leaf and flower buds of the coming season, stood boldly out and defied the severest cold. From the "Outlook" we went down the long slope of the hill, crossed Cascade Brook, and commenced the laborious task of breaking out a new path. We lost the trail on account of wind-falls; but after a little beating around, we took an easterly course through quite a tract of small growth, and came out into an opening which was probably the old site of "Beckytown." Here the party divided, most of them to return by another route; but the smaller number determined to push on. Bidding good-by, with many regrets, to the girls we left behind us, we scrambled through the thicket and came out on the bank of the Norway Brook.

The snow-covered stream being a much better highway for snow-shoeing than the banks with their thick growth of shrubbery, we availed ourselves of this opportunity for easy traveling, slid down the slope, and gathered together. We were six, two being ladies, both of them good mountain-climbers and accustomed to the use of snow-shoes.

When we left Elliot's, our intention was to go to "the V" or somewhere else. We had our lunch and were out for all day. Up the stream and in the direction we intended to go, at no very great distance apparently, stood a lofty mountain, grand and inviting. It was the north peak of Tripyramid. The steep western slope was suggestive. We looked. All were of the same mind, but we said "nothing at all." The river was covered with ice and snow, the ridges and hummocks of which showed plainly the best places for walking. Depressions were avoided, and air-holes were left at a safe distance. We soon reached Avalanche Brook. Here the swift waters of both streams uniting caused a large air-hole in the ice-crust, obliging us to hug the north shore closely. But with all our caution the snow-shoe of one of the ladies broke through the snow-arch, but with no serious results.

Crossing to the right side of Avalanche Brook, we had quite a stretch of good walking. I was leading off here, when suddenly one of the party in the rear shouted "Look out!" which I immediately did — from an opening that I had dropped into. A portion of the ice-bridge had given way, and I stood on the river-bed. I scrambled out, and the others got over without any difficulty. Some distance above here, open water appeared again.

We left the brook, went into the woods, and came out on a bluff. Another stream coming down from the mountains empties into Avalanche Brook at this place. We let ourselves down from the bluff by a tree that hung very conveniently over the bank, crossed over, and again started up Avalanche.

An eighth of a mile above, we left the brook for good, entered the open woods, and began to rise rapidly. Another eighth of a mile and a mass of debris, covering acres of ground, appeared on our left. Tree-trunks by the thousand were piled up in the most promiscuous manner. This proved

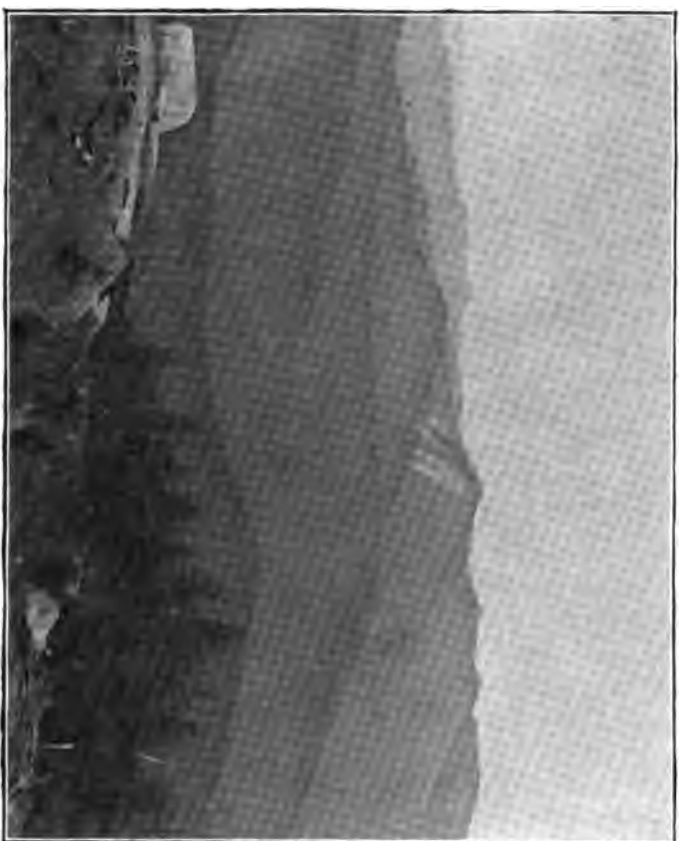
to be a large portion of the material that composed the great slide of August, 1885.¹ A bend in the brook at this place caused the mass to lodge here, over a mile below the base of the slide, thereby preventing the terrible havoc that would have taken place had it continued down Mad River.

We kept away to the right, and finding ourselves on a great ascending ridge, also worked upward. Another half-hour of steady climbing; then as it was one o'clock, we concluded to rest a short time and eat our lunch. As I carried what little food I wanted in my pocket, I started off on a contour to the right, exploring. It appeared that we were on a great rounded ridge; and the farther to the right I went, the steeper it grew, for I was getting into one of those great gullies that descend to the base of the mountain. The woods were so much more open that, in looking up, the top of the mountain could be seen, the spruce-trees upon it seeming like bushes, they were so far away. Working my way back, I found the party about ready to start again.

From this point the grade was rapid, and nothing could be seen but trees and the great snowy slope rising steep above us. The trees were of large growth,—great spruces, with a mixture of different kinds of hard wood,—and they kept their size and were lofty to within a short distance of the summit. It took us one hour and a half from our resting-place to reach the top, and we did not stop once. First one, then another took the lead, breaking out the way; and the ladies were up with us all the time. The climbing was of the hardest kind: the snow soft and heavy, loading the shoe at every step. The rise was continuous, with no break of any kind for relief, no gully or cross ravine, no ledge until we reached the top. It was simply up, and at an angle that obliged one to lift the snow-shoes as high as possible, and make many steps with little progress. We spent no time looking at the distant prospect.

At about a quarter before three I sighted a rounded, snow-clad summit above us. We were soon on it; but it proved to be only one of many open ledges that jut out and fall away

¹ A noticeable feature in Plate III. A most interesting account of this and other slides is given in APPALACHIA, vol. iv. p. 177.



VIEW OF TRIPYRAMID FROM MOUNT OSCEOLA.

FROM A PHOTOGRAPH BY CHARLES P. HOWARD.

from the top. We passed about six of these, thinking each one the true summit; but finally rounding over one and crawling through the scrub, the top appeared at some distance to the east. At three o'clock — just five hours' time from the house — we stood upon it. Its area is quite small, covered with spruce growth, but not densely. The labor to clear it would be very little. The elevation is 4,189 feet. We, upon the surface of the snow, were about five feet higher. There is considerable short growth, from five to six feet in height, which kept the snow from being blown away; but the trees themselves were very loosely packed. Stepping on the top of one that projected above the snow, one of the party went down almost out of sight, and it took considerable floundering to get out again. We were quite warm from our exercise, and thought it imprudent to stop long, as a thin scud was floating over and the air was cool.

The lifting clouds gave us glimpses in all directions except the north. The long ridge of Tripyramid went off towards the south, and across a deep col the middle peak rose like an inverted wedge, not truncated in the least. The South Peak was very much more blunt and rounded. They looked far away, but we would have liked nothing better than to have returned that way. Black Mountain, with all its spurs, peaks, and ravines, was near and impressive. The zigzag of the ridges which the path goes over shows plainly why it is the best, although the longest, course up that mountain. Tecumseh and Osceola were dark and cloud-capped. One glimpse into the Swift River Valley made us wish for more.

We felt well repaid for our short-time view, and at a quarter-past three started down over the ledges and into the woods. We found it as hard to go down as it had been to go up. The soft snow would load the toe of the shoe, and we took several headers, but landed softly. About one third of the way down, looking through the thin growth of trees, a lovely picture was revealed to us in the west. Framed by the dark, sloping sides of Osceola on the left, and by Kancamagus on the right, with the gray clouds above, was an opening, through which the bright, clear sky and snowy mountain-peaks were revealed, bathed in the golden glow of sunlight.

We were soon down on the more gentle slope, where we made better time. We passed the log-jam, followed down on the right-hand side of the brook, avoiding the tributary and bluff, and turned into the ravine of Norway Brook. The background between Tecumseh and Osceola was a mass of very dark clouds, through the rifts and openings of which streamed the last rays of the setting sun. The deep, rich color in all its hues was something wonderful, and the snow on the river caught and reflected the rosy tints,—a perfect winter picture. It lasted until we reached the woods; then darkness settled down. After crossing Cascade Brook, night was fairly upon us. We pushed forward at a lively pace up the long slope, then down through the clearing, and reached the house at a quarter-past six, just as the supper-bell was ringing.

The Land of the Causse.

First Paper.

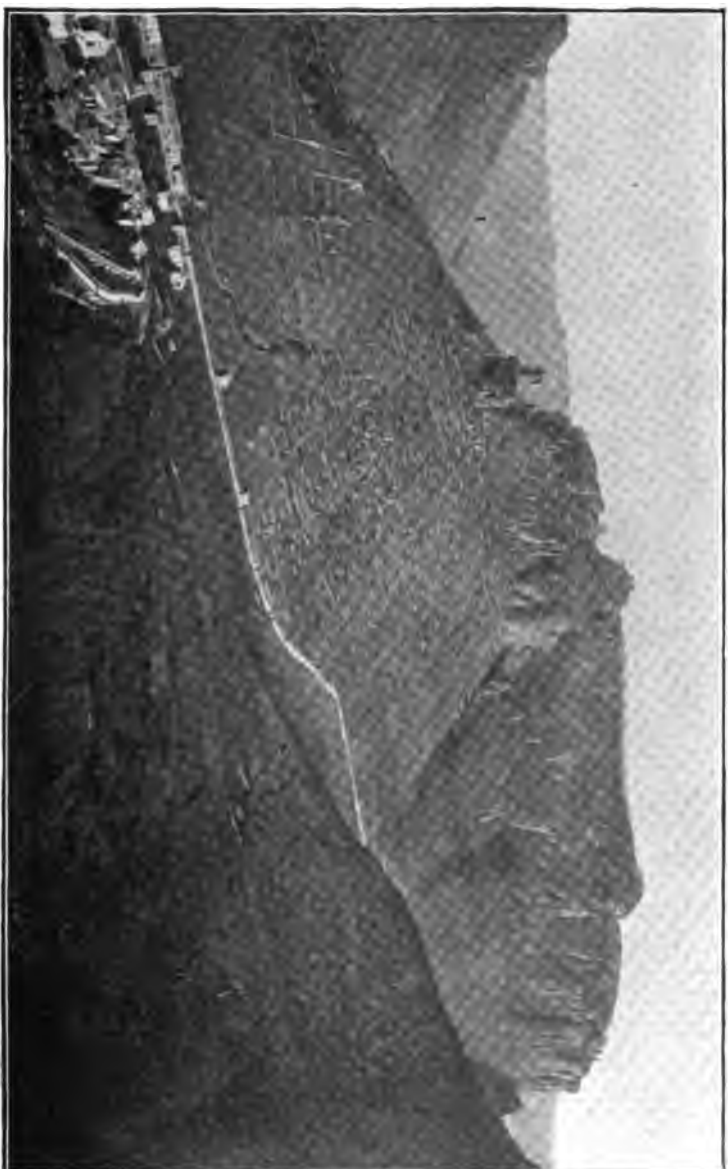
THE CAÑON OF THE TARN, MONTPELLIER-LE-VIEUX.

BY EDOUARD ALFRED MARTEL.

Translated by F. W. FRENCH.

THE Causse¹ are extensive districts in Southern France, forming the southern slope of the central plateau and the western declivity of the Cévennes. They adjoin on the east the granite and schist formations of Mont Lozère (5,331 feet) and L'Aigoual (5,093 feet). They cover a great part of the departments of Dordogne, Corrèze, Lot, Lozère, Aveyron, Gard, and Hérault. Formerly these table-lands—built up during the secondary geological epoch at the bottom of the sea to the thickness of more than 1,600 feet, by the accumulated grains of sand and of organic remains—formed one continuous mass; but by the erosion of narrow water-courses, this mass was gradually cut up into a number of independent plateaus, from 800 to 4,100 feet of elevation.

¹ The word *causse* comes from the Latin *calx*, through the Provençal *caous*.



JUNCTION OF THE TARN AND THE JONTE.—CAUSSE MÉJEAN.

FROM A PHOTOGRAPH BY CASIMIR JULIEN, MILLAU.

Such are the causses of Sarladais, Martel, Gramat (the largest of all), Limogne, Rodez, Sauveterre, Méjean (the driest, highest, and most isolated, attached to L'Aigoual by an isthmus which at one point is only 33 feet across), the Causse Noir (the smallest and most picturesque), and the Larzac. The Caussees are really naked deserts, gloomy, monotonous, without water or wood, and almost without inhabitants.

This country remained almost unknown until, in 1879, M. Lequeutre, a member of the French Alpine Club, first drew attention to its curiosities. Since that time it has been carefully explored by Messrs. de Malafosse, Trutat, Gaupillat, and especially by the author of this article, who has devoted to it all his vacations and his leisure since 1883.

By their efforts it has been shown that the upper basins of the Dordogne, the Lot, the Tarn, and the Hérault abound in picturesque scenery hitherto unknown, geological features never suspected, as remarkable as the celebrated scenery of the cañons of the Colorado.

In this region are found strange valleys, as deep as they are wide, the enclosing cliffs of which are over 1,600 feet in vertical height; the rocks are purple, and the streams clear as crystal. Forests of trees are less conspicuous than forests of natural obelisks, cut and fashioned from bed-rock by long-continued erosion of water. Finally, one may travel in canoes along tortuous streams, in deep defiles, where there is no room for a road between the water and the enclosing wall.

All this, however, which may without difficulty be admired in the brilliant sunlight, is not the most striking feature of the country. The landscapes constitute the *reverse*; the *obverse* lies deep in the bowels of the earth, where are hidden marvels, some of which have never been seen until recently: grottos miles in length, hung with enormous stalactites; underground rivers, never yet meandered; subterranean lakes, overhung with a sparkling canopy of crystallization as beautiful as those of underground Austria; a whole world, dark and hidden, transformed into fairy palaces under the magnesium light, weird to the visitor, exciting to the discoverer.

As may easily be inferred from a careful inspection of the

map,¹ the cañons which separate the Caussees from each other are immense fissures from 1,300 to 2,000 feet deep, from 100 to 1,600 feet wide at the bottom, and from a half mile to a mile wide at the top; at the bottom of these run rivers, between walls often vertical in their entire height.

One would naturally expect to find these enormous troughs dark and forbidding. By no means; the light plays freely in them, and makes them seem like sunlit abysses. Sometimes the walls come so near together that they leave room only for a narrow thread of water; again they separate, giving space for fertile fields, vineyards, and rich orchards, so that the traveller is charmed by the contrasts of the different parts of the cañons, especially after he has passed several hours on the monotonous and desolate *causse* above.

That which gives these gorges their special beauty, their uniqueness, is the dolomite formation of their walls, weathered as they are by frost, rain, hail, and shattered by lightning into towers, turrets, and crenellated battlements, marked by salts of iron with brilliant, variegated shades of red, yellow, and orange. Nowhere but in dolomite formations is found such revelry of color, such ruin-like crags, or more fantastic cliffs.

The cañon of the Tarn is the most beautiful of all. Through a course of forty-six miles, from Florac to Millau, the stream flows in a narrow, winding fissure, 1,600 feet in mean depth, between cliffs in color like a brilliant sunset sky.

As regards the impression of grandeur and strangeness produced on the traveller, there are only three places in the world more remarkable than the Cañon of the Tarn, — the dolomite Alps of the Tyrol and Venetia, the Spanish side of Mont Perdu (Vallée d'Arrasas) in the Pyrenees, and the Grand Cañon of the Colorado in Arizona. Of course I have no intention of comparing it with the glacial regions of the high Alps. There is no more analogy between Mont Blanc and the Cañon of the Tarn, between the Aletsch glacier and the Cañon of the Colorado, than between the Parthenon and the Cathedral of Notre Dame. They are entirely distinct types, but both equally wonderful.

¹ La carte de l'État-major français au 80,000*, feuilles de Séverac, 208, et d'Alais, 209.

The general disposition of the land in all this region is as follows : first, a cliff of 160 feet (dolomite, of the lower lias), below which the stream is so hemmed in that it cannot be seen ; next, a talus of oolitic marl (650 feet), inclined at an angle of 35 degrees, and on the slopes of which run roads and paths ; next, a second cliff (500 feet), vertical and red, of Bajocian dolomite ; and as a fourth tier, the Oxford limestone (300 feet), the thin layers of which, as they rise, retreat like the steps of a staircase.

When one tries to describe the forms presented by the surface of the upper cliff, all shattered by the elements, he must continually use terms borrowed from the art of fortification, the vocabulary of which is very soon exhausted.

After these preliminary geographical statements, let us begin the descent of the Cañon of the Tarn.

The mode of locomotion adds much to the charm of this voyage. By the river-side there is no room for a road, so we must descend by boat for twenty-eight miles, — that is to say, for a day and a half, — sometimes gently poled along in the *planiols*, or reaches, deep and calm, where the Tarn looks like a great lake ; sometimes swiftly whirled along by the current over the pebbly beds of *ratchs*, or rapids. The reach called “le Déroit” or “les Étroits” (the Narrows), near Malène, is, as its name implies, the most contracted of all. The lower cliffs of dolomite tower to the height of 325 feet, and are so close together that in 1876, during a terrible inundation, the water here rose sixty-five feet in a few hours. They are all full of caves, where, in 1793, priests and nobles found refuge from the revolutionists.

The traveller at the bottom of this abyss sees, 1,600 feet above his head, the rocky peaks on the edge of the Méjean and Sauveterre Causse, standing out against the blue sky, with vultures circling over him as over their prey. At the lower end of “the Narrows” the eye comprehends this pass in all its height for a distance of about half a mile. Here there is very little talus between the two strata of dolomite, and the walls rise in one sweep to their full height. It is the grandest view in the Cañon of the Tarn.

I first visited Lozère after having spent ten summers in

the Alps and three in the Pyrenees, climbing over glaciers and snowy peaks. I ought, therefore, to have become somewhat surfeited with mountain scenery; and yet the Cañon of the Tarn so excited my admiration that I returned three years in succession, the third time with greater pleasure than the first.

As if to rest the eyes after this scenery, almost too imposing, the banks of the river below "the Narrows" present a multitude of pretty details, of picturesque and fantastic rock forms. Here it is a natural bridge, recalling by its form the Prebischthor of Saxon Switzerland; there, a huge arch like the Manneporte of Étretat; farther on, a cave in which the torrent foams and boils.

We come next to the Cirque des Baumes, a huge amphitheatre, where a bend in the Tarn allows the photographer to catch both banks at once. The cliffs curve away from each other, thus forming a veritable cylindrical pit. What is specially noticeable is the remarkable development of the lower tier of dolomite, which here rises to a height of more than 650 feet. When the red walls are illumined by the rays of the setting sun, and the entire amphitheatre is like a blazing brazier; when torn and brilliant clouds drift over the abyss like banners of smoke twisted by the wind,—the weirdness of the place is almost frightful. Yet all this is not gloomy or monotonous, thanks to the vigorous vegetation freshened by the waters of the Tarn and numerous tributary springs.

At the exit from the Cirque des Baumes the river disappears under a chaotic mass of broken rock (le Pas de Soucy), compelling the traveller to land and walk for nearly a mile before reaching another boat at the other side of this natural dam. On the way the boatmen do not fail to tell a pretty legend, according to which the devil, pursued by Saint Enmie, came near being crushed under this avalanche of rocks, set in motion in answer to the saint's prayer; but there was a crack in the bed of the Tarn, by which the evil spirit was able to regain the lower world, though not without leaving the print of his claw on one of the blocks, which had quite crushed it.



LES ÉTROITS (THE NARROWS), NEAR MALÈNE.

FROM A PHOTOGRAPH BY C. JULIEN.

True to the law of contrasts, which gives such a charming variety to the scenery, the cañon widens below the Pas de Soucy at the hamlet of Vignes; then, for six miles more, with alternate narrowing and widening, it brings us to the village of Peyreleau, thirteen miles above Millau, at the junction of the Tarn and the Jonte, and at the western end of the Causse Méjean.

The cañons of the Jonte, the Trévesel, and the Vis are like those of the Tarn.¹ That of the Hérault, to the southeast of Larzac, deserves special mention. The Hérault, from Saint-Bauzille-le-Putois to the village of Saint-Guilhem-le-Désert, falls 162 feet in twenty-one miles. The stream is dammed at several points for mills, and is crossed by three bridges. For half the distance there are no roads, nor even foot-paths, near the river. No boat had ever succeeded in making the descent; in fact, nothing certain was known of more than half of this little cañon, which is limestone, like the others, and from 500 to 1,300 feet deep.

On June 30 and July 1, 1889, my cousin M. Gaupillat and I, in an "Osgood portable folding canoe," followed the stream for the first time from Saint-Bauzille to Saint-Guilhem,—a dangerous voyage, owing to the numerous whirlpools and rapids; very fatiguing also, because in many places, where the banks rose vertically, and the bed of the stream was filled with dangerous reefs, it was necessary to leap into the water, catch with one hand the projecting corners of the rocks, and with the other steady and direct our frail boat. Twice it was caught in a powerful current, and nearly wrenched from our grasp. Three times a rapid in a bend threw us irresistibly against the bushes which bristled along the banks, and we were nearly capsized. At other times we shipped so much water that we were in danger of foundering. It was not exactly a pleasure excursion; the labor is too much for two men alone, and the portages too frequent. The longest level in which we could float at ease was not over half a mile long. We had to land more than fifty times. It is a pity that a continuous foot-path at least does not exist

¹ See my work, "*Les Cévennes et la région des Causse*;" Paris, Delagrave, 1890, 8°, 400 pp., 150 illustrations, and 11 maps and plans.

along the right bank, as the views would be almost equal to those along the Tarn,—the crest of the heights of Baudran (830 feet); the mill-pond of Bertrand; the cascade and mill of Figuières, with its old tower; and especially the cliff of Puéchabon, 1,300 feet high, a mile and a half long, and quite vertical. But why describe all this? We should merely be repeating the picture of the other cañons; and then some tourists would be breaking their legs along this wild stream, at the foot of these rock-crowned slopes, among these bold cliffs, these loosely balanced rocks, these impenetrable thickets of vegetation. For six miles, along the cliffs of Puéchabon in the most beautiful part of the gorge, there is no sign of habitation or path. It is solitude itself.

Along the crest of the plateaus or at the bottom of their cañons the calcareous rock has been carved by erosion into a multitude of monumental forms, no less curious than those of the Garden of the Gods or of the Bad Lands. Sometimes these monuments are crowded side by side in a veritable chaos. The most remarkable collection of this sort is Montpellier-le-Vieux.

Montpellier-le-Vieux is a city of rocks, built by Nature and ruined by erosion,—a sort of gigantic natural Pompeii or Karnak. Though situated only seven miles east of Millau, the principal town of Aveyron, and covering an area of four square miles, Montpellier-le-Vieux had, up to 1883, escaped the notice of tourists and geographers, and did not appear on the government map until 1889. From a topographical point of view alone it has proved a genuine geographical find.

This city of rocks has streets, squares, triumphal arches, and fortifications with all the appearance of human construction. It hangs, like the Gardens of Babylon, on the edge of the Causse Noir, buttressed by red cliffs of dolomite that rise 1,300 feet above the valley of the Dourbie on the south, the ravine of Valat-Nègre on the west, and of Riou-Sec on the east, between the village of Roque-Sainte-Marguerite on the Dourbie, and the hamlet of Maubert on the Causse Noir.

In the space thus marked out the official map shows an indefinite white oval, indicating thereby a flat portion of the plateau. Now this flat oval, representing a space of about a

mile long by half a mile broad, is just the most uneven part of the Cévennes. Instead of a plain, we really find there five deep depressions (*cirques*), arranged around a higher central part (the Citadel), which towers above them from 325 to 400 feet. Of these *cirques* the largest, which might represent the city proper, is called "la Millière;" the smallest, but the most beautiful, "les Rouquettes," would then be the amphitheatre; the others are "les Amats," "la Citerne," and "le Lac," representing severally the parade ground, the roundway, and the cemetery. These five enclosures are walled in by a line of rocky ramparts which form a perfect natural fortification.

The rock masses are arranged in long parallel lines, the spaces between these constituting the streets of the city. The construction of Montpellier-le-Vieux is due to erosion on a grand scale. The dolomite in this part of the Causse Noir happened to be very unequal in hardness, containing some sandstone; the action of water removed the friable veins of the rock, thus excavating the streets, while it left standing the harder masses, thus erecting these curious monuments.

How many centuries did this work of erosion go on? How many centuries have passed since it was finished? Very daring would he be who should try to answer these questions, especially in view of the fact that not a single drop of water remains in all this dry mass of limestone. We do not even know to what geological epoch we should assign this tremendous excavation.

France contains two other cities of this sort, of similar material, and reared by the same forces, — Mourèze near Lodève in Hérault, and the forest of Païolive near Vallon in Ardèche; but neither of these has such colossal proportions, or presents such fantastic forms.

The area of the five amphitheatres of Montpellier-le-Vieux is 300 acres; including the monuments and the rock cascades which fall into its ravines and over the precipices of the Dourbie, the city, outside the inner line of fortification, covers 1,500 acres. In fact, the area amounts to 2,500 acres, — about four square miles, — if we include three important groups of rocks having towers two hundred feet high, lying beyond Valat-Nègre, Maubert, and Riou-Sec, which stand

related to Montpellier-le-Vieux like a circle of detached forts or suburban towns.

The existence of this unique mimic city was suspected in 1880; it was superficially explored in 1881 and 1882 by several large landed proprietors of the region; but not until 1883 did these gentlemen — Messieurs de Barbeyrac, de Riencourt, and Louis de Malafosse — fully make it known to the world. In 1884 I made the first complete exploration; while M. Chabanon, a notary of Ganges, M. Trutat, director of the Museum of Natural History at Toulouse, and M. Julien of Millau took a number of interesting photographs. Finally, in 1885, I drew a careful topographical map of the place (scale 1: 10,000); and several hundred tourists came to gaze in wonder at the country thus recently discovered in the very midst of France.

Two causes contributed to this long concealment of Montpellier-le-Vieux: first, its position on the edge of a plateau, behind a rocky rampart, which gave to one looking at it from the valley below no hint of what lay behind it; and second, local superstition, for the people of the neighborhood were afraid of the ruins. For them it was a city destroyed by the devil, a retreat of goblins and gnomes; they would not enter the accursed city, and took good care not to mention the place to travellers who passed within a few hundred yards of its walls without dreaming of its existence. Shepherds, however, had from a distance cast a timid glance at its labyrinths. Struck by the regularity of its streets, as straight as if laid out by a surveyor's chain, they had compared these avenues, apparently artificial, with those they had seen in Montpellier, the chief city of the Department of Hérault, — the largest city of the vicinity, and hence the city *par excellence* for them, — and thus they had called it Montpellier-le-Vieux.

For full details I refer the reader to my work on "Les Cévennes;" but I may here allude to a few of the numberless curiosities of this dolomitic metropolis: "la Citadelle," crowned with its three towers, — "le Corridor," rising above the adjacent level to the height of 75 feet, "la Ciudad," 98 feet, and "le Douminal," 95 feet. "La Ciudad" rises about 3,000 feet above the sea-level, and 1,420 feet above the



CIRQUE DES ROUQUETTES.—MONTPELLIER-LE-VEUX.

FROM A PHOTOGRAPH BY M. CHARANON.

adjacent valley of the Dourbie. "La Cirque des Rouquettes," the floor of which is 2,294 above sea-level, is 400 feet below the summit of "la Ciudad." Around its sides run tiers of benches, on which it is only necessary to place a "grand stand" to give it the appearance of an arena for a bull-fight. Several passages converge towards the centre, immense issues capable of giving exit to thousands of spectators. The south-east wall has fallen into the Dourbie over a precipice 1,040 feet high, as if it had yielded to the pressure of the water during a naval mock-fight of giants, making a breach like that in the Amphitheatre of Thysdrus at El-Djem in Tunis.

Walking the streets between windowless walls, resembling the houses of an Arab city, one does not know whether he is awake or dreaming; and were it not for the briars, one could easily imagine himself wandering through the avenues of some gigantic Pompeii.

Rocks in the form of mushrooms, with their base worn away to a narrow support, surprise us by their bold outline, and attest the power of the water which has swept away all the friable portions of the rock. There is one which classicists call the Altar, and romanticists the Devil's Bath-tub; then there are the Wine-jar, the Dog's Head, the Chessboard with its Bishop, Castle, Knight, etc. Obelisks abound, as erect and slender as those of Egypt; and one avenue called "the Street of the Obelisks" reminds one of the ruins of Luxor; one of these monoliths, called "la Quille" (the Ninepin), is not less than 130 feet high. Here, as in the Cañon of the Tarn, a luxuriant vegetation brightens the landscape; but the height of the walls dwarfs the proportions of large trees until they look like mere shrubs.

The strangest freak of all Montpellier-le-Vieux is certainly the Gate of Mycenæ, which roughly resembles the famous Gate of the Lions of that Argive city. It is forty feet high; and through its archway, twenty feet in height, we see in the distance one of the towers of defence standing on the rampart which surrounds the five amphitheatres.

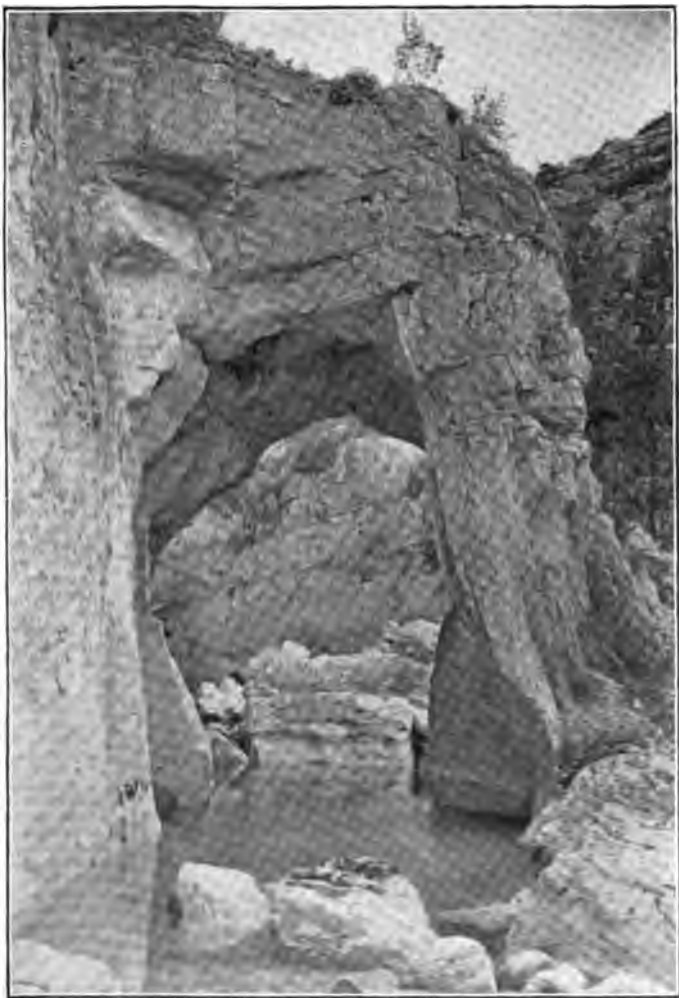
Certainly the sandstone pillars of the Saxon Switzerland and the huge archways of Étretat in Normandy are no less curious; but the waters of the Elbe and the waves of the

English Channel still beat against their base and explain their formation ; there erosion is still going on. At Montpellier-le-Vieux, however, there is not a drop of water ; one would say that the water, after having built up, cut away, and carefully sculptured this enchanted city, had voluntarily sunk into the earth for fear of spoiling so beautiful a structure.

If the caprices of Nature have elsewhere, here and there, reached the same degree of strangeness, nowhere have they shown so much power, profusion, or variety. For many other phenomena of erosion abound in the region of the Causse. A little over two miles west-southwest of Peyreleau (in Aveyron, on the Jonte) there is a natural bridge called "le Pont des Arcs" (the Bridge of Arches). It is $13\frac{1}{2}$ feet high ; the arch is of 20 feet span, and $11\frac{1}{2}$ feet high. The platform is $3\frac{3}{4}$ feet wide and $2\frac{3}{4}$ feet thick. This bridge has been fashioned, evidently by water erosion, from a rock 45 feet long, one end of which rests upon another block. Wagons pass under this bridge in going to the forest for wood.

On the southern edge of the Causse Noir, above the valley of the Dourbie, west of Valat-Nègre, and between Montpellier-le-Vieux and the village of Longuiers, the rocky chaos of Causou, unexplored down to 1889, has revealed to us natural obelisks, arches, and pyramids from thirty to sixty feet high, carved and worn into shape by the wild revels of waters in distant ages. An arched opening, ten feet wide and high, in a long wall of dolomite looks remarkably like an artificial doorway. From this point we get a striking general view of Montpellier-le-Vieux.

Finally, two and a half miles to the eastward, on the other side of Riou-Sec, northeast of the hamlet of Roque-Sainte-Marguerite, we visited for the first time in 1889 the savagely piled rocks of Rajol, literally hanging on the crest of the plateau 1,300 feet above the valley of the Dourbie. There the scene beggars description ; the caprices of Nature are perhaps still more surprising than at Montpellier-le-Vieux. In a space of 1,600 feet long by 1,000 wide, in the prolongation of the ridge of Roques-Altes, marked on the map as 2,750 feet above sea-level, we see nothing but giant



ERODED ARCADE.—RAVINE OF THE ARCHES.

FROM A PHOTOGRAPH BY M. GAUPILLAT.

statues, architectural pilasters, sculptured pyramids, Roman and Gothic portals, strong bastions, and corbeled hoardings. A dozen obelisks with rounded forms, some of them sixty-five feet high, recall at a distance a procession of cowed monks, or the columns of a pillared hall shaken by an earthquake. One of them, fifty feet high, crowned with a real capital, ought to be called "the Egyptian Column."

In the midst of these ruins rises a natural donjon with its crenelations and loopholes, through which we may thrust our head and see the Dourbie rolling past at the dizzy depth of 1,200 feet below us. On the edge is pierced the double door called "the Dromedary." Here two oval openings have been formed in the rock,—one just above the other; the architrave of the upper one forms the neck and head,—rather long, it is true,—while a protuberance in the rock forms the animal's hump. From one point of view, particularly favorable, the resemblance is perfectly laughable.

Half a day is needed to examine all these curiosities artistically carved by the chisel of erosion, even in the stratified foundations of the Causse. Perhaps others like these remain to be discovered in this region.

One word on the Ravin des Arcs, tributary to the Hérault, through which runs the generally dry watercourse of Lauralon, which through seven miles of its winding way carries off the surface drainage to a point almost directly opposite Embougette and the mouth of the Buèges. The middle portion of this tortuous furrow is one of the most curious gorges in all the Cévennes. Tourists pass near it without seeing it, and geographers are still ignorant of its existence. Neither from above nor from below, neither from the road nor from the Hérault, can it be reached. Walls of rock several yards high, roaring cascades after a heavy rain, bar its bed above and below. It is accessible only by approaching it across lots from Saint-Martin-de-Londres and Mascla on the south, and climbing down the side cliffs. No less capriciously than in the dolomites of the greater Causse, the waters have worn the rocks into huge ruins; and the multiplicity of natural doors and arches has given to this remarkable part of the valley the name "Ravine of the Arches." Any one attempt-

ing to traverse the gorge after heavy rains would have to swim in the enormous *gours*, or "giants' kettles," worn by the waters in the lapse of ages ; it would be an original sort of excursion, and refreshing on a hot summer day. Some of these pools are over 300 feet in diameter.

Bandai-san, Miomote, and Matsushima.

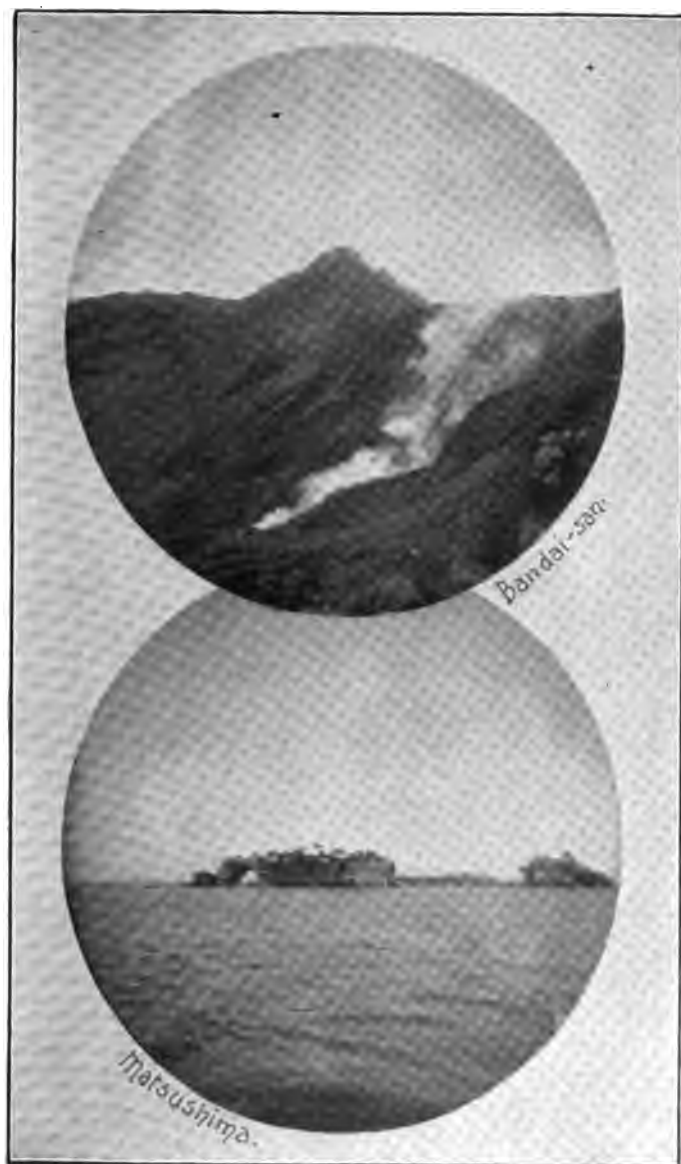
BY ROSEWELL B. LAWRENCE.

Read December 8, 1891.

A DELIGHTFUL afternoon and evening in early July ; an invitation to tea not far from Chestnut Hill ; a long *tête-à-tête* about the ever-present charm of Japanese scenery ; pictures of pretty Japanese maidens ; a Japanese boy, of real flesh and blood, to answer the clap of one's hands, — do you wonder that a long-cherished desire to visit Japan was stimulated beyond resistance ?

Six months later when my friend called to bid me good-by, his last words were, "I'll see you in Japan." We came near meeting in China, where he did not intend to stop, and I did not intend to go. In registering at the Astor House, Shanghai, I found his name just ahead of mine ; we had actually passed each other. A card awaited me at my banker's in Yokohama ; but as I had planned for that week a trip to Miyanoshita with a Japanese friend, I wrote my American friend that I would call upon him Saturday evening. But to Miyanoshita he went too. He stopped at the big foreign hotel ; I at a Japanese inn close by. I did not dream of his near presence, and he could not imagine his foreign friend sitting on the floor and eating with chopsticks.

Saturday evening I presented myself, and after talking over what had been and what might have been, we turned from the unsatisfactory past to the future, full of delightful possibilities. He wished me to go south with him, to Shikoku. I ungraciously declined, urging him to go north with me to Bandai-san, the mountain which was blown up in 1888, and



FROM PHOTOGRAPHS BY R. B. LAWRENCE.

also to Matsushima, one of the *san-kei*, three most beautiful scenes, of Japan. But, it was alleged, every one had been going to Bandai-san the past three years; and Matsushima, like many other things Japanese, was pretty, nothing more. However, there was a tremendous gorge in the mountains of the far northwest, where rocky precipitous walls were skirted by a treacherous mountain-path, high above the foaming torrent. A bargain was struck; between the threadbare Bandai-san and the tame Matsushima should be sandwiched the grand and glorious Miomote.

To my friend and his efficient Japanese boy I left all the preparations, consenting to canned meats and bread; and wisely, for part of the country through which we travelled was so poor that to have lived upon the Japanese food would have been a process of slow starvation. Eight hours by rail brought us to the provincial town of Motomiya; and in the gathering twilight bags, boxes, bundles, cameras, Japanese boy, not to mention the foreigners, were whisked through the streets to the best inn of the place. A dinner of soup, meat, bread, and butter was ready about nine, and at eleven we stretched ourselves upon the floor. Bedsteads did not form a part of our impedimenta. A Japanese house is so lightly constructed with sliding partitions of paper, that the slightest noise is heard throughout the inn. The presence of foreigners, not to mention many Japanese guests, had quite upset the household, and there was a continuous din, lasting till long after midnight and beginning again before dawn.

No sooner were we astir, at half-past five, than a crowd began to gather in the street to watch the movements of the foreigners. I will not attempt to say which of us had the most admirers. Into five jinrikishas we packed ourselves and our belongings. Ten pullers, fleet of foot, seized the shafts; and off we started for Inawashiro, distant ten ri, twenty-five miles. The morning was fine, and the ride enjoyable, especially where the road lay along the shore of Lake Inawashiro, across whose waters we had a beautiful view of Bandai-san, the mountain which won so great notoriety by exploding. It was a frightful catastrophe, and the present condition of the mountain is an impressive illustration of the terrific forces of

Nature. We stopped at the little village at whose edge, three years ago, had also stopped the overwhelming stream of mud which poured from the mountain's riven side.

A heavy thunder-shower in the night brought a change of weather; and in the morning dark gray clouds capped the peaks, and a cold wind swept down the mountain. Nothing daunted, we made an early start. Up the grassy slope we tramped. Azaleas of different shades, honeysuckle, white rhododendron, and other flowers lined the path, while below us spread the beautiful lake with its village-dotted shore and encircling hills. But when we reached the col, beauty changed to desolation. The eruption was not of the usual type, but was probably an explosion caused by the generation of an unusual amount of steam. For a day or two previous, strange rumblings were heard, and the hot springs on the mountain-side ceased to flow. At 7.30, one morning, there was a terrible earthquake; at 7.45 came a second shock; at 7.55 the earth heaved like the sea, rising and falling two or three feet, occasioning a sickening sensation. Then, with a frightful explosion, one of the peaks rose into the air, and an enormous hole was rent in the mountain-side,—an abyss 1,500 feet across and 800 feet deep. A great mass of rock and earth was thrown up, and then a gigantic wave of rocks and liquid mud rushed down the mountain-side at the rate of forty miles an hour, overwhelming villages and rice-fields and destroying four hundred and sixty-one lives. This wave of mud surged up the hillsides and then retreated. It piled up rocks and earth, making a dam four hundred feet high and a lake six miles long, and, spreading out, covered fourteen square miles. What destruction in a valley once so peaceful and luxuriant!

Crawling to the edge of the horrible hole (the wind was blowing about forty miles an hour), we pointed our cameras and took shots at the clouds of steam and sulphurous fumes rising from the crevices hundreds of feet below. Had the edge crumbled beneath us, we should have been precipitated at least five hundred feet; but to the edge I went, the temptation being irresistible. The poor Japanese boy, however, was too terrified to climb the ridge at all. It well repaid the little risk. The terrible grandeur of the scene, that enormous hole,

the clouds of steam, and the howling gale enabled the imagination to form a faint idea of the awful explosion itself and the tremendous forces which caused it.

Down the mountain-side we went, until, on a level with the floor of the crater, we turned to look back at the scene of desolation. Hardly less impressive was the view as we looked up into the horrible ravine, — at the clouds of surging, hissing steam; the precipitous walls, cut clean as with a knife, showing the strata of rock for hundreds of feet in depth; and above all, piercing the clouds, the remaining peaks, standing sentinel over the open grave of their departed sister. The top of the vanished peak was perhaps 1,500 feet above the bottom of the hole, and all this material was cast down the mountain-side. Huge boulders, weighing many tons, were hurled through the air into the valley below, together with a vast amount of broken rock, gravel, and trees. On we tramped over this mass of debris, — solidified mud, great rocks, and tree-trunks stripped of bark and twisted out of all shape; over mountain hamlets buried hundreds of feet, and along the edge of the stream of mud where it washed against the trees that it did not fell. There was no lava; for steam, not fire, was the agent of this awful destruction. From an elevated position we stopped to take a view of the desolate scene, with the crater and the mountain peaks away in the distance.

A long day's tramp brought us to Hibara, — or what remains of it, for a part of the village lies beneath the waters of the new lake. To our chagrin *uma*, the packhorse, which had been sent around the mountain, had not arrived. What was to be done? No canned meats, no bread and butter, no coffee, no condensed milk, no forks, no spoons, no sheets. The ill-fitting shoji of the old inn let in numerous draughts of cold air, the charcoal was poor, and the hibachi small. The rice was — not white, and the other things we had to eat were not appetizing. Thanks, however, to previous experience, we were happy. A bath in the Japanese bathtub, along with the stove, furnished heat enough to last till bedtime; seasoned with a good appetite, the rice, etc., were more palatable than they looked; and then, too, chopsticks are good enough if you only think so.

The next night we stopped in a little farming-village, Tsunagi, at an inn where we enjoyed a new experience. Of the Japanese insects which torment man's flesh, some hop, others sing, and still others crawl; but among them all is not found the pest familiar to people who sleep on bedsteads. Shall I pronounce the common name, or substitute the Latin, *cimex tectularius*? The festive mosquito swarms in his season, and it is practically impossible to avoid fleas in Japan, for they infest the straw mats. I do not recollect whether we had hopping and singing insects at Tsunagi, but I do remember that we found specimens of a crawling species.

As we tramped along the road from Tsunagi, we met a curious object coming towards us, an apparently animated mass of straw. It was a beast of burden loaded with an immense pack of rice straw. Animals are used in Japan to a certain extent; but the bulk of the transportation is done on human backs, or on handcarts pushed and pulled by men with the assistance of their wives and children. Sometimes the work in the fields is done wholly by human labor, but horses and indeed bulls are often used.

Soon after noon of the next day we arrived at the large town of Yonezawa. The inn was comfortable, and opened upon an attractive garden. In the room adjoining ours we found a shrine, and upon it offerings of food, presumably to propitiate the spirits of departed ancestors. None of them returned while I was taking a picture. But if they did not show themselves, they at least made themselves felt. As I was lying upon the floor stretched upon my back to rest, and my companion sitting on the balcony rail writing his journal, each of us felt a double shake, then after a pause a single one. The gods to be propitiated were those of the nether world.

In the cool of the afternoon we continued our journey over good roads and at a high rate for human steeds. Glorious views were ours to enjoy,— the beautiful valley, the foothills, and the snow-capped Azahi-take and Gwas-san, "Dawn Peak" and "Moon Mountain." It was half-past five when our kurumaya stopped to rest beneath a stately tree, a triple cryptomeria. Would that I might transport it to adorn some New England lawn! At half-past seven our kurumaya halted be-

fore the "Mountain-side Inn" at the village of Tenoko. Upon entering we found ourselves in a large room which served as kitchen and bathroom, as well as dining and sleeping room for servants and coolies. The master of the house welcomed us, bowing his head to the floor and then rising with dignified grace and a kindly expression which assured us royal treatment. "What a fine-looking man!" said my friend, "and what an attractive face!" "Yes, and would that he might pour tea for us!" I added. And pour tea for us he did. He led us to the best room, opening upon a pretty garden of trees and flowers, vases and rocks. In the middle of the floor was a capacious hibachi, a beautiful ornament, made from a section of a camphor-tree. Hither also he brought his choicest screens, treasured heirlooms of his family, decorated with the paintings of noted artists, the lines of famous poets, and the letters and autographs of great men, travellers and guests at the inn. His most expensive tea, treasured in a dainty jar, was offered cup after cup, till in dismay lest the green powder should bring to us a sleepless night, we declined further libations.

A bright sun and a clear sky ushered in another beautiful day, and a good road and light-hearted coolies again made travelling delightful. Trees draped with the graceful wistaria lent an added charm to the ever-beautiful country. Over a mountain pass we rode, and then descended into the river gorge beyond. From an Axenstrasse, cut in the conglomerate cliff, we looked down upon the mountain torrent roaring amid the rocks below. A forest of beech, horse-chestnut, cedar, and cryptomeria clothed the mountain side, while above, the snowy peaks pierced the azure sky. A stone bridge with its fine arch enhanced the beauty of the spot, and offered good view-points from which to enjoy the grand scenery of the gorge both below and above. On we sped till lunch-time. Then from Oguni to Futano, a distance of two ri, we were unmercifully jolted over a bad road. I remained in my jinrikisha, in order that my pullers, who had said the road was good, might earn the full measure of their wages. Finally a walk of a ri or so brought us to Arasawa, where we stopped at the house of the head-man of the village. Here we were

Pomfret in northeastern Connecticut. They probably also occur plentifully in other parts of that State, reaching southward to Long Island Sound ; for Round Hill in Orange, near New Haven, described by Professor J. D. Dana, appears to be a drumlin.

New York has a magnificent area of drumlins, perhaps the most interesting in the United States, which stretches more than sixty miles from Syracuse westward, nearly to Rochester, lying between Lake Ontario and the "Finger Lakes." These hills are well seen along the New York Central and West Shore railroads. No drumlins have been found in Ohio, Indiana, and Illinois, by Mr. Frank Leverett, Professor Wright, and others, who have thoroughly examined that area, mapping its terminal moraines and other drift deposits.

Next, northwestward, drumlins are again encountered in great abundance and variety in the east part of Wisconsin and adjoining portions of the upper peninsula of Michigan, where Professor T. C. Chamberlin estimates their number to be probably not less than 5,000. Throughout a large region farther northwest, comprising Minnesota, northern and central Iowa, South and North Dakota, and southern Manitoba, Professor N. H. Winchell's and my own exploration and mapping of the drift and its terminal moraines have failed to discover any of the peculiarly moulded masses of till classed as drumlins. Beyond this region drumlins have been reported only by Mr. J. B. Tyrrell, in Lake Winnipegosis, where they form groups of lenticular and elongated low islands, and in the district between Hatchet Lake and Lake Athabasca, far northward in the central part of British America.

Because the drumlins are the most fully and distinctively developed class of drift deposits in Boston and its vicinity, they have been the subject of many papers before the Boston Society of Natural History, during the past twenty-two years, by Professors Shaler, Wright, Hitchcock, Davis, and Crosby, and by the present writer. The following list comprises these papers and some others which relate to the drumlins of our district ; and to this list it is hoped that contributions by Mr. Barton will soon be added.

N. S. Shaler, "On the Parallel Ridges of Glacial Drift in eastern Massachusetts," *Proceedings Boston Society of Natural History*, vol. xiii., 1870, pp. 196-204. *Illustrations of the Earth's Surface: Glaciers*, 1881, pp. 60-63. U. S. Geol. Survey, *Seventh Annual Report*, for 1886, pp. 321, 322; *Ninth Annual Report*, for 1888, pp. 550, 551.

G. Frederick Wright, *Proc. B. S. N. H.*, vol. xix., 1876, p. 58, and vol. xx., 1879, p. 217. *The Ice Age in North America*, 1889, chapter xi., containing illustrations and maps of drumlins near Boston.

C. H. Hitchcock, "Lenticular Hills of Glacial Drift," *Proc. B. S. N. H.*, vol. xix. pp. 63-67.

W. M. Davis, *Illustrations of the Earth's Surface: Glaciers*, text describing Plate xxiv. *Proc. B. S. N. H.*, vol. xxii., 1882, pp. 34, 40-42. "Drumlins," *Science*, vol. iv. pp. 418-420, with illustrations, Oct. 31, 1884. "The Distribution and Origin of Drumlins," *Am. Jour. Sci.*, III., vol. xxviii. pp. 407-416, Dec., 1884.

W. O. Crosby, "Composition of the Till or Boulder-clay," *Proc. B. S. N. H.*, vol. xxv., 1890, pp. 115-140.

Warren Upham, "Glacial Drift in Boston and its Vicinity," *Proc. B. S. N. H.*, vol. xx., 1879, pp. 220-234. *Geology of N. H.*, Atlas and vol. iii., 1878, pp. 285-309, with heliotype. "Marine Shells and Fragments of Shells in the Till near Boston," *Proc. B. S. N. H.*, vol. xxiv., 1888, pp. 127-141; also in *Am. Jour. Sci.*, III. vol. xxxvii., May, 1889. "The Structure of Drumlins," *Proc. B. S. N. H.*, vol. xxiv., 1889, pp. 228-242, containing a map and sections of the drumlins named Third and Fourth Cliffs in Scituate, Mass., and descriptions of sections of drumlins in Boston Harbor, and of Central Hill in Somerville. "The Origin of Drumlins," *Proc. B. S. N. H.*, vol. xxvi., 1892-1893, pp. 2-17. "Conditions of Accumulation of Drumlins," *Am. Geologist*, vol. x. pp. 339-362, Dec., 1892.

The purpose of geologic investigations is, by careful observations, descriptions, and study, to reach true explanations of the causes of things. In the case of the drumlins, two chief questions are to be answered: How did the ice-sheet amass these hills? Why are they distributed in abundance upon some districts, but absent or represented only by a few examples upon other large areas? Their distribution is to so

large a degree independent of topographic features and of the character of underlying rocks, that the explanation of their origin and grouping appears more likely to be found in variable conditions of the glacial movements resulting from secular climatic changes during the final melting of the ice.

Numerous theories of the mode of formation of drumlins have been proposed by Shaler, Hitchcock and Wright, King and Dana, Kinahan, Close, and Davis. Against each of these theories there seem to me to be fatal objections; so that I have been led to the following new view of the origin of drumlins, based largely on my studies of the sections of Third and Fourth Cliffs in Scituate, Mass., and on Professor I. C. Russell's observations of the Malaspina glacier or ice-sheet in Alaska, which is covered on its borders by drift that was once englacial, that is, enclosed within the ice, but has now become exposed on its surface by ablation or superficial melting.

Whenever the warm climate terminating the Glacial period extended unchecked through many years, the depth of the ablation of the outer part of the ice-sheet was probably not less than fifteen to twenty-five feet each summer, as has been observed on the Muir glacier in Alaska and on the Mer de Glace in Switzerland. At such rates of melting any district enveloped by ice 2,000 to 4,000 feet thick, as was true of the central portions of New England, and doubtless also of a broad belt thence west to the Laurentian lakes and to Minnesota and southern Manitoba, would be uncovered in one or two centuries, and the recession of the glacial boundary would average probably a half-mile or more yearly. During any long series of years when the ice-sheet was being thus rapidly melted, its outer portion to a distance of probably twenty miles from its boundary, being reduced by ablation to a thickness ranging from 100 feet and less upward to 1,000 feet, would bear on its surface, especially in the valleys and hydrographic basins of its melting, much drift which had been before contained in the higher part of the ice. Only scanty englacial drift, mainly consisting of boulders borne away from hills and mountains, appears to have existed at altitudes exceeding 1,000 or 1,500 feet; but all the lower ice probably contained an increasing proportion of detritus and boulders,

which had been brought into it from below by the upward movements due to faster flow of the central and upper glacial currents than of those retarded by friction on the ground. The thinned border of the ice-sheet upon the belt having a remaining thickness of less than 1,000 feet would therefore become covered with drift, as Russell has described the borders of the broad Malaspina glacier, which stretches from the Mt. St. Elias range to the ocean.

At many times the general recession of the ice-sheet was temporarily interrupted. The return of a prevailingly cold climate for several decades of years, or occasionally, as we may suppose, for a century or more, brought increased snowfall, which sufficed to hold the ice boundary nearly stationary, perhaps frequently first having pushed it again a considerable distance forward. The thick ice lying far back from the border may then have flowed over its previously thin and drift-covered outer belt, aiding with the new snowfall to envelop the once superglacial drift stratum within the ice-sheet. These halts or re-advances, if the front of the ice had a nearly constant position during several years, became marked by terminal moraines, of which I have mapped a series of eleven in consecutive order from south to north in Minnesota, North Dakota, and Manitoba, while Mr. Leverett has traced a still larger number through Illinois, Indiana, and Ohio. With the increased thickness and steeper gradient of the outer belt of the ice-sheet while the recession of its boundary was slackened, wholly stopped, or changed to a re-advance, due mainly to very abundant snowfalls, much drift which had been formerly exposed on the ice surface would become again englacial, so that a stratum of drift several feet thick might be enclosed in the ice at an altitude increasing inward from less than 50 feet to 500 feet or more.

The upper current of the thickened ice above the englacial bed of drift would move faster than that drift, which in like manner would outstrip the lower current of the ice in contact with the ground. Close to the glacial boundary, whether it halted and even re-advanced, or merely its retreat was much slackened but did not entirely cease, which latter seems proba-

bly to have been the case with the drumlin areas of Massachusetts and New Hampshire, the upper part of the ice must have descended over the lower part. This differential and shearing movement, as I think, gathered the stratum of englacial drift into the great lenticular masses or sometimes longer ridges of the drumlins, thinly underlain by ice and overridden by the upper ice flowing downward to the boundary and bringing with it the formerly higher part of the drift stratum to be added to these growing drift accumulations. The courses of the glacial currents and their convergences to the places occupied by the drumlins were apparently not determined so much by the topography of the underlying land as by the contour of the ice surface, which under its ablation had become sculptured into valleys, hills, ridges, and peaks, the isolation of the elevations by deep intervening hollows being doubtless most conspicuous near the ice-margin. I find great difficulty in forming a conception of convergent basal currents powerful enough, in spite of their friction on the land, to amass these hills; but the inequalities of contour of the outer belt of the ice, as irregularly thinned by ablation, may well have produced upper and central currents of sufficient energy to sweep the englacial drift stratum into irregularly grouped and scattered or even solitary drumlins, when new ice and snowfields added a considerable depth over all the previous drift-covered surface of the ice-sheet.

At first sight, this explanation of the accumulation of the drumlins appears to be opposed by two conspicuous objections, which must be answered. The first is the local derivation of much of their material. Where the peculiarities and restricted limits of the adjacent rock formations on the north permit an approximate determination of the distances of transportation of the drift forming the drumlins, it is found that a large part, sometimes more than half, has been carried only a few miles. It seems surprising that local material should constitute so important an element of the drift contained within the ice at considerable heights, until we consider how fast it would be uplifted by even a very slight upward inclination of the basal current of the ice. If the drift eroded from any place was carried up with an average ascent of only one degree, it would

rise, within one mile, to an altitude of ninety-two feet above the ground, and within two or three miles would be as high as the tops of the most prominent drumlins.

The second objection alluded to arises from the abundance or frequency of glaciated stones and boulders in the till of the drumlins, and from its compactness, flaky lamination, and other features which prove it to be subglacial till or ground moraine. If this drift was englacial during a considerable time and became massed in these hills beneath only a few hundreds of feet of ice, could it present so impressive characteristics of subglacial accumulation under heavy pressure? To this question we must reply that the stratum of englacial drift would be subjected to much wear of its boulders and smaller rock fragments, as they were carried forward with shearing and sliding motion to the drumlin accumulations, and that in becoming lodged on the surface of the drumlins or on other and low deposits of subglacial till, they would be further striated and planed. The previously englacial drift in being so transported and deposited would acquire all the marks of ice-wear which the till of the drumlins exhibits, and the pressure of 500 to 1,000 feet, more or less, of solid ice flowing downward across it would seem adequate to produce its very hard and compact condition. We are thus able, as I believe, to account for all the differences between these deposits and the mostly unworn drift which fell loosely on the surface from an englacial or superglacial position when the ice disappeared.

It is probable that the border of the ice-sheet when fast retreating had usually a more steeply sloping surface than in its time of greatest extent to the south, and that consequently the rate of motion of the outer part was commonly increased during the final melting. Any pause of the retreat for even a few years would therefore form a moraine, though the outer belt of the ice may have been generally too steep to expose much superglacial drift. But during some stages of the recession we may conclude that considerable tracts of the ice-border were so thinned by ablation that much englacial drift became superglacial, with the result that when again a colder climate brought a temporary thickening of this marginal ice the pre-

vously superglacial stratum of drift was chiefly amassed in drumlins. The known drumlin areas of New Brunswick and New England, New York, Wisconsin, Manitoba, and the district southeast of Lake Athabasca, may therefore all be referable to the same stages of the closing part of the Ice age.

Our drumlins remain to-day essentially the same as when they were first uncovered by the receding ice. The short Postglacial epoch has been insufficient for much erosion of their surfaces by rains and by rills flowing down their slopes. In comparison with the antiquity of the long cycle of stream erosion which has shaped the Appalachian mountain ranges and the rock hills and mountains of Massachusetts, the drumlins and all other forms of our drift deposits are very new.

Nymphs no longer inhabit the grand and beautiful vistas of the world of Nature. The modern poet, philosopher, and scientist expect no naiad in the brook, no dryad in the forest, no oread on the hills and mountains. Their voices are silent, and will not return. But in other language, which may be understood only by much listening, long acquaintance, and communion with these hills, they tell a "fairy tale of science," of the deep white mantle of snow and ice in the Glacial period, and of much rasping, mixing, heaping, and pressing, until they were left as drumlins to puzzle geologists and afford to artists and common people delightful prospects from their summits.

A Wagon-Trip to the Grand Cañon of the Colorado River.

By C. H. TYLER TOWNSEND.

Read February 8, 1898.

It was my good fortune during the past summer to make a trip by wagon from Las Cruces, New Mexico, to the Grand Cañon of the Colorado River, in the interests of the New Mexico College of Agriculture. Our party consisted of three persons, the other two besides myself being the college botanist, who was to look after the plants while I gathered in the

insects, and one of the college students, who was to attend to the team and the various camp duties, such as gathering wood and cooking. The purely scientific results of the trip will be detailed elsewhere, and I shall confine myself here to describing the visit to the Cañon, with a mention of the more important itinerary incidents of the journey thither.

We drove out of Las Cruces, on the afternoon of June 12, 1892, with four animals hitched to a covered government ambulance-wagon. For many days we had been making up lists of what it would be necessary to take along. Our wagon contained all requisite collecting materials for gathering in the insect and vegetable kingdoms: canned and other eatables, and camp outfit for cooking; guns, and cartridges and shells to order; blankets, bedding, and a tent; and other articles of use, from maps of the country down to horse-feed. Our total load, live and dead weight, was not underestimated at half a ton. The wagon was a strong one, and weighed as much more. We proposed to renew our provisions, and horse-feed especially, at various places on the way. It was well that we took a strong wagon. Of our animals, the wheelers were a span of large American mules, which were hired with the wagon. The leaders we put on ourselves; they consisted of our two saddle-horses. We expected to average with this desert caravan about twenty-five miles a day, and wanted to reach Flagstaff, Arizona, by the first of July, so as to join a similar party under Professor Toumey from the University of Arizona, who were also bound for the Cañon. We had therefore about twenty days in which to make the trip to Flagstaff, — a distance of five hundred miles, not allowing time for accidents.

We proceeded up the Rio Grande valley to Rincon, about thirty-five miles north; but camped the first night after making only about twelve miles, so as to start in gradually with our team. This first camp was near old Fort Selden, now nearly deserted, excepting by buffalo gnats and other blood-thirsty diptera, — like all the rest of the region adjacent to the Rio Grande at this season of the year. After leaving Rincon, we turned west and crossed the river on the railroad bridge,

which is planked so as to allow of the passage of teams. We were now on the west side of the Rio Grande, and followed the river up to Las Palomos. The road is very picturesque in places, especially so where it runs along the edge of the stream, the banks on this side being usually rather high and abrupt. There were some inviting spots where we would have liked to tarry awhile, but time was limited. As we neared Palomos, we saw many immense patches of mud-swallows' nests, built on the abrupt sides of cliffs.

From Palomos we turned to the left, and struck northwest across a mesa country to Cuchilla Negra, and then on in the same direction to the Cañada Alamosa. Both of these places are approached from the east by high and hard mesa roads, excellent for travelling, — in fact, about the best we found on the trip. Both are entered from the same direction by going down steep hills into a small sunken valley. Cuchilla Negra is situated in a wonderful little valley, deep down like a great hole in the mesa. The road going down into the Cañada Alamosa is particularly steep and long, and winds around to the right, being cut in the side of a hill, and with a precipitous descent on the left hand. It is not any too wide, and is therefore a little ticklish, especially with four animals and a heavy wagon. But our brakes were newly shod, and our driver had a cool head and a steady hand.

The Cañada Alamosa is a narrow cañon or valley in the mesa about five miles long, with a stream running its full length, and extends in a northwest and southeasterly direction. The road crosses and recrosses this stream, which is only ankle-deep, except when swollen by floods. The Cañada contains ranches here and there, while the town is situated at its eastern or lower end. The cañon gradually narrows towards its upper end, until at its extreme head it becomes a little box-cañon entirely filled by the stream, which has to be forded. Here the walls of rock are not more than fifteen feet from each other, and about 150 feet high. Farther down they are in places as high as 300 or 400 feet, but farther apart. The road up this valley is fearful, however, on account of rocks and sand.

We drove into the stream and on up its course, with the

walls of rock close by on either hand, when a few steps brought us to a turn, and we were out upon an open plain. Our surprise and delight were great. We now had a good road, and Ojo Caliente lay before us. Behind us the stream left the plain, and rushed in between the high walls of rock, to course down the length of the picturesque cañada. It was a beautiful sight.

Ojo Caliente comprises two large flat adobe buildings, opposite which, to the north of the road, are some black, muddy patches,—the Hot Springs. There was formerly a military post here. A few miles on we came to Horse Camp, which is an immense enclosure, fenced off with barbed wire. It used to belong to the military fort at Ojo. It now has an adobe house and a very strong corral. While we were there, a freighter from Fairview passed by. He had eight animals hitched to two wagons, the wagons being locked together. The hind wagon was of a peculiar build, with a sort of roof to it, like a boat turned upside down. We had turned north at Ojo, and we kept on in this direction to Luera Spring. Here we turned west, and drove across the plains of San Augustine (not the plains of this name near the Organ Mountains), to Horse Spring. Here we began to enter the mountains which form the backbone of the continent, the Cordilleras of western New Mexico; and we would before long reach the Continental Divide. About five miles from Horse Spring, after winding between some large hills, we suddenly emerged upon the settlement put down on the maps as Patterson.

The "town" of Patterson consists of a single rather large adobe house, owned by a Mr. Patterson, who has a beautiful spring and lake of water, entirely enclosed by fence. This was a most welcome sight to us. We were out of horse-feed and other necessities, and here we replenished our stores. Mr. Patterson is a jolly, open-hearted man, of large stature, originally from New England, who followed whaling on the seas for a time, and came to this spot in New Mexico in 1866, where he has remained ever since. His place was at our disposal. He is postmaster, mayor, sheriff, and all in one, and we were glad to know that we could mail letters, which was

totally unlooked for by us. He told us that he had made many "good Indians"¹ since he came here, and that neither the Apaches nor the Texas cow-boys could "run him out." We pushed on the same evening to the west, and camped on the Continental Divide, at an elevation of over 7,000 feet.

Our course still lay in the main nearly due west as far as Springerville, Arizona. After crossing the Divide and going a few miles, we climbed a stony hill and entered upon some of the most rocky road that it has ever been my misfortune to encounter with a wagon. It was "*mal pais*," or black lava, and completely covered the face of the country in all directions. The trail was faint; there was no soil, only rocks; and the only marks left by wagons were the marks of the wheels on the rock. This road continued for two miles, the wagon simply pitching from one rock to another, and we were glad indeed when we finally left this hill behind and reached a plain where was situated Gallo Spring. We found the spring was not dry; but it was putrid with numbers of dead cattle that had mired themselves therein. We therefore watered our animals only, and continued on the road down a long arroyo. A little before dark we reached a small stream, the Rio Apache, which came down from the west side from Apache Spring. At this point the arroyo, or watercourse, that we had followed for several miles, where we had been in constant danger of tipping over from the rocky and sideling road, broadened out into a small cañon, and at the point where the stream joined it was a wide, level area, enclosed on all sides by high hills and ridges. This was one of the prettiest places we had yet seen on the trip. A quarter of a mile farther down the cañon is another level enclosed area among the mountains, where was an old log-house, and on a hill beside it a stone fort. The place was deserted. The whole aspect of this locality was rugged, wild, and yet beautiful.

We turned out of this cañon by going back a mile or so to turn west, and then we kept on over mountains, up and down, in a way that was perfectly awful. I shall never forget one steep sideling hill we went down, where two of us held the

¹ "There is no good Indian but a dead Indian." *Proverb of the Plains.* — Ed.

upper hind wheel and slid down the hill with our feet braced. Then on the opposite side there was a fearful up-hill, where the horses had to work hard, and literally had to "stick their toe-nails" into the smooth rock. I would never have believed they could get the wagon up there if I had not seen it done. There was no other way for us to do but to try it, and we succeeded. We had a splendid set of animals; every one of them would pull until he dropped. And so we went on until we came out upon a level stretch; then mounting an elevated plain ahead, we saw a wonderful panorama of mountains before us in the distance. Farther on we came to a small spring; then down between the mountains we went, over one, and afterward out into a beautiful valley stretching for miles before us. This was called Johnson's Basin. Here we saw a new, unpainted, pine-board house,—a novel sight to us, as most buildings in this region are either adobe or stone. We kept on for many miles over a level, pasture-like road, the mountain scenery around and in the distance ahead enchanting us, while I caught numberless grasshoppers in my net by holding it out as the wagon sped along. After crossing this valley we came to a house where were six children, besides a maid, and the mother was a very pleasant-looking woman. In the last six days, or since leaving the Cañada Alamosa, we had seen only ten human beings until we reached this house; and in the last two days we had not seen one besides ourselves. In the six days above referred to we had travelled 125 miles.

The next day we reached Manguitos Spring, then on to the Arizona line, and stopped to water at Pratt's place. We camped that night at Coyote Spring, and the following day reached Springerville, where we went to a blacksmith-shop for repairs, and laid in a new stock of provisions. From Springerville we struck nearly north to Concho, passing springs and swales along the road in several places, the swales filled with high grass and reeds, and giving forth an awful stench from the dead cattle they contained. In these places there were always great numbers of a small, yellow, most bloodthirsty horsefly (*Chrysops fulvaster*). For the last two days two of us had ridden horseback, owing to the fact that the leaders broke away

on one occasion and smashed their doubletree. This had been repaired ; but we still continued on horseback, as the road was fairly good, and the mules could quite easily pull the wagon alone. The horseflies above mentioned tried to bite through my overalls, and even attacked the leather girths of my saddle. Above Concho we put up the tent for the first time since starting, on account of a fearful wind-storm, and camped snugly. The next day we struck the river-bed of the Little Colorado, having put the saddle-horses on as leaders again. The bed of this river seems to be one long snare of quicksands. Here it was nearly dry on top, or only muddy, and we saw many cattle in the quicksands slowly dying, so deep in that they could never be extricated. There were cows there that seemed to have died long ago and dried up, appearing exactly like the dead carcasses with the hide on that are so often seen on the plains ; but if one watched these apparent carcasses for a few moments, the eyes might be seen to wink, and an occasional spasmodic breathing motion would be noticed. They usually lay on one side, and were sunk until the upper side was on a level with the muddy sand. One cow that was hopelessly covered and still breathing, I shot to end her misery.

We followed the course of this (on top) nearly dry river of quicksand all the way to the San Francisco Wash, passing through Woodruff, Holbrook, and Winslow on the way, the last two places being on the Atchison and Pacific Railroad. At Holbrook we first struck the railroad, and got our mail, having travelled more than three hundred miles since we last saw this token of civilization near Rincon (N. M.). The weather now was oppressively hot, the air being one succession of hot blasts for days at a time. We crossed the Little Colorado near Winslow in safety, having watered our animals before starting into it so as to avoid stopping in the quicksands. There was water here, but not deep. We saw the top of a wagon that had gone down a few days before, only five or six feet down stream from where we crossed. The driver got off the regular ford, and succeeded in getting his horses and load out ; but the wagon sank too rapidly and had to be left. We had to follow the Little Colorado as far north

as the San Francisco Wash, about thirty-five miles northwest of Winslow, so as to get around the Cañon Diablo, which is a fearful cut with perpendicular walls of rock, level with the plain and crossed only by the railroad bridge. We had just crossed the wash, which was dry and leads from the above cañon, when we sighted two horsemen coming toward us on a road at right angles to our own. We soon perceived that they were Indians. They crossed our road just in front of us; we stopped and they stopped. They could talk no English and but little Spanish, but we finally gathered some information from them about the road. They were tough-looking customers, had good horses and saddles, and plenty of guns. Their saddles had square pommels, which were driven full of brass-headed nails. They had fine blankets also, and were probably Moquis, along the edge of whose reservation we had been travelling for some miles. One of them asked for tobacco. I took our driver's knife and cut a good piece off a plug which I took from my coat-pocket, and which the reader need not guess was brought along exclusively for feeding Indians on such occasions. The Indian to whom I handed it bit off a piece, then handed it to his companion, who also bit off a piece and returned it to the first Indian, who then put it in his pocket. We said *Adios*, and the next day reached Turkey Tanks about noon, driving into Flagstaff the same evening; in other words, about 7 P. M. on July 1. We therefore conformed pretty closely to our intention of reaching Flagstaff about the first of July; and, strange to say, we found that the party from the University of Arizona had arrived only two hours previously! They had come a less distance, and had started before we did.

It is noticeable that there are few or no Mexicans in Northern Arizona. They are met with all over New Mexico; and in Springerville, which is farther south in Arizona, I had seen plenty of them running horseback and trying to pick up a bottle of whiskey, leaning from the saddle. They broke the bottle before they got it, and spilled most of the whiskey.

We were now only seventy miles by road from the Grand Cañon, the deepest and grandest part of it being a little west of

north from Flagstaff, at Hance's place on the rim. On July 3 the combined Arizona and New Mexico party, being also augmented by the arrival of another professor from Las Cruces, who had come on the train, started from Flagstaff for the Cañon. We passed San Francisco Mountain on the way, having determined to stop and climb it on our way back. About eight miles beyond the mountain, having taken the west road around it, we took the right-hand road by mistake and travelled fully ten miles on the old Mormon trail which leads up into Southern Utah. This was the first time on the trip that we missed our way. We had to come back the next day, and reached Cedar Ranch (Hull Spring) just at noon, in the midst of a thunder-storm,—the first rain we had seen since leaving Las Cruces, where it seldom rains! Just as we stopped, down came a fearful hail-storm, with enormous hail-stones, and we had to jump out and make the best of it, trying to unhitch the now almost frantic animals, which like ourselves were being pelted right and left. There were three of us to four animals; but it was with difficulty that we finally got them free of the harness and wagon, and dragged them into the partial shelter of some scrub junipers. The hail then ceased.

The next day about noon we reached the rim of the Cañon in another thunderstorm. I had jumped out of the wagon and gone ahead on foot, and the Arizona party were behind us, having stopped for shelter under some trees while the rain was pouring down and flooding the road. The rain had slackened, and I reached Hance's place, which, with the Cañon and all the surrounding country for that matter, had been shut off from our view by the thick forest through which our road approaches the rim. Hance's cabin and the stage company's tents are situated in a little hollow only a few rods from the rim, but on a lower level. Up the slope I hurried, being the first one of the two parties to reach the rim, when a sight met my gaze, grand in the extreme, and utterly beyond the power of language to describe. I had seen Niagara, but there was no comparison between the two in the magnificent extent of distances and depths that lay spread out here before the eye. I had travelled by rail from the Mexican capital nearly to the coast, had seen the snow cap of Orizaba, and

viewed vast plains from a height of thousands of feet in the mountains above. But this was more concentrated, and exhibited more rugged grandeur. I had read about the Cañon, had seen photographs of it, but still I was unprepared for this first view. No one can form any conception of this stupendous chasm until he sees it with his own eyes. A more definite approach to a conception may be had when it is stated that at least twenty echoes may be counted to a pistol-shot fired on the rim.

This is the most advantageous point to see the Cañon. The following topographical features may be noted, the figures for which were kindly furnished me by the United States Geological Survey in Washington. The Grand Cañon is about 240 miles long, the walls being the highest at Hance's. The south, or rather southeast, rim at this point is 7,500 feet above the sea. The opposite, or north, rim is 8,500 feet. The two rims are about fifteen miles distant from each other. The Colorado River, which flows, or rather rushes, along at the bottom about in the middle of this great chasm, is 2,500 feet above sea-level here. The river is, therefore, 5,000 feet, or nearly a mile, vertically below the south rim, and almost $1\frac{1}{2}$ miles below the opposite rim. The Cañon is not one immense furrow fifteen miles wide, but is filled with immense precipitous ridges and hog-backs running irregularly from all points at the sides to the river, and more or less at right angles to the latter; these ridges divide side cañons several miles in length, which have been washed out by streams tributary to the Colorado River in times past. I am informed by the Survey that the geologists of the country agree in believing that the Grand Cañon is entirely the result of erosion. Down one of these side cañons, about seven miles in length, winds the Hance trail, made entirely by Mr. John Hance, who owns the place on the rim above referred to, where he has lived for the past eight years. He told us that he made it entirely with his own hands, aided by pick and shovel, and that it took him two years to do it. This is the path down which we were to proceed on the morrow.

In the mean time dinner was prepared, the tents were set up, and the weather cleared. After dinner, it being too late

to think of beginning the descent that afternoon, a portion of the party, myself included, determined to follow down the rim to the west about three quarters of a mile, where it appeared that by climbing out a narrow and dipping hog-back we could get upon an immense ledge of rock that stood some distance out in the Cañon, the top of which was about on a level with the rim. We reached the place, and found, as we had anticipated, that it was more difficult than it looked from afar; but with a little hard work we descended to the dip of the ridge, followed it out, and then climbed up toward the high ledge. With considerable difficulty we reached a point at the base of the cap rock, which went up perpendicularly seventy or eighty feet higher. Here farther progress seemed impossible, and the party was divided. Professor Toumey and I finally found a wide vertical fissure between two columns of the rock, in which boulders had lodged at various intervals; and feeling each one as we proceeded to see if it would hold firm, we finally reached the top. It was, however, a very ticklish climb, and a slip would have dropped us a thousand feet below. Professor Hagerty, who came on the train from Las Cruces to Flagstaff, also reached the top after us; but the rest of the party would not risk it. After leaving our names on a piece of paper under a sheltering rock on top, we most cautiously and laboriously descended, one at a time, as we had gone up.

When we reached the base of the cap rock again, our attention was attracted to a huge boulder which lay very close to the edge of a shelving or inclined ledge on the west side of the ridge. This boulder was compact limestone, about three feet in two dimensions and two feet in the other, and we carefully estimated that it would weigh fully 2,800 pounds, or nearly a ton and a half. Its position on the edge of the sloping shelf was such that we believed our combined efforts would be able to set it off. There was a clear drop of a hundred feet below it; then the ground sloped away rapidly for a long distance. We had set off many large rocks already at several places along the edge of the Cañon; but we estimated that if this one could be induced to go, its effect would outshine that of all the others put together. We had positive information that

there was no one in this part of the Cañon ; in fact, one could scarcely reach such a place either from above or below ; so we lay down on our backs, all three of us, grasped some shrubs behind us with our hands, and placed our feet flat against the side of the rock. At a given signal we braced ourselves, and the great rock gradually slid off the shelf. It went down a hundred feet before striking, then with a rebound it struck a large live pine-tree and snapped it in two like a straw. After transforming a huge log into kindling-wood, it went on a short distance, struck a rock, and bounded forty or fifty feet across a small chasm, which it cleared in one mighty parabola. Striking on a ledge of rock on the opposite side, it did not break, but only raised an immense cloud of fine dust like smoke, and went crashing on. It continued without doubt for a mile before it came to a standstill, and its course could be marked down the gorge by the cloud of dust that it raised. It was without any doubt the grandest spectacle of the kind that we ever witnessed.

On the morning of Friday, the 8th of July, we prepared ourselves for the descent into "the hole." Each man took a blanket, enough food to last him as long as he desired to stay in the Cañon, and collecting paraphernalia ; the latter consisted in my own case of insect-net and handle, which I used for a walking-stick, two boxes for pinning insects in, insect-pins, cyanide and alcohol vials, note-book, etc. A photograph was taken of the combined party on the rim, just before we began the descent, — each man with his luggage on his back, or wherever he preferred to carry it. Mr. Cordley, of the Agricultural Department, Washington, who with myself constituted the bug-hunters of the expedition, took the photograph. The bugs were also persecuted by Mr. Cordley's brother-in-law, Mr. Swarthout, from Michigan, who accompanied and helped Mr. Cordley in collecting. Professors Toumey and Wooton were the botanists ; and Professor Hagerty and Mr. Larkin, our driver, completed the party, which, therefore, numbered seven. We had considerable luggage, and Mr. Hance had kindly proffered us the use of his *burros*, at two dollars each a day. He told us we would find it hard enough to take ourselves down, without any further

encumbrance; and we did not doubt (?)¹ his word in the least, but thought we could worry along some way and carry our own loads. We paid one dollar each for the privilege of going down Mr. Hance's trail, — which is a very modest sum for the amount of work that must have been put upon it.

Proceeding up the rim for a quarter of a mile to the north-east, we came to the place where the trail leads down. Here was a small square area enclosed by fence. Getting through this, we started down the trail. The day was perfect. The first mile and a half is the steepest part of the descent; the trail zigzags, and yet is very steep. Two miles down is a stone cabin, known as "Mr. Hance's winter residence." This is 2,500 feet below the rim. I reached this in a few minutes over an hour and a half, and carried at least fifteen pounds on my back; the others came in later. Here we took lunch beside a small stream which rises from a spring near by. This stream sinks a few rods below the cabin, and seeps out again about a mile or so farther down the Cañon, whence it runs continuously to the Colorado River. After lunch, and a smoke on my part, we resumed the trail for the river. It was very hot. The walls of our side cañon began to spread out; then they narrowed again near the point where the stream seeps out. We followed down the stream, which was most picturesque, and soon came to the place which is called the Temple of Sett, where an immense wall of rock overhangs the way. Still down we continued, the stream of clear water flowing through numberless natural bathtubs in the rock, eroded by the action of water. We would fain have plunged in these, but we were anxious to catch sight of the turbulent Colorado. Our Cañon had now "boxed up," and the walls approached closely on either hand. Ropes were used in descending drops in the granite. Then we had to go up a rope, and down another farther on. On we went, scrambling through narrow places which were entirely occupied by the stream.

¹ Mr. Hance showed us a rifle with which he said he had killed a deer so far off that the meat spoiled before he could get to it. The supposition was that the ground was moderately level, and it is only fair to suppose also that Mr. Hance was in his usual able-bodied condition at the time.

Mr. Larkin had been ahead of me for some time, but I was in turn ahead of the rest of the party. Suddenly, on turning an angle of the Cañon, I brought up on the edge of a shelf down which the stream dropped forty feet straight. At the bottom, on the gravel-bed, sat Mr. Larkin, and two travellers who had gone down the day before, and were now on their way back from the river. My appearance was the signal for a shout, which I lustily echoed. These fellows had been waiting to see the fun when the rest of us should appear on the brink. There was a rope to go down, but it was wet from hanging in the water. I took off my shoes, threw my luggage to the spectators at the bottom, and with a wild yell, which was echoed by the others, I swung down the torrent. It was now my turn to see the fun; and we all waited. In about five minutes the relief corps appeared at the top with a look of inquiring dismay upon its face, and we set up a yell that might have brought the cliffs down upon us if they had not been firmly grounded. This strengthened their courage; and with considerable yelling on both sides, and unbounded laughter on our part below, they all finally reached the bottom in safety. The two travellers who had just come up from the river told us that the latter was still a quarter of a mile on; and we hurried along, after taking a photograph of the scene.

Going down a last short rope, we emerged upon an enclosed area of white sand at the edge of the river, whose roar had been heard for some distance back. Here we sat upon the rocks, and satisfied our gaze upon the turmoil of waters, on which Powell and his party and later a Denver railroad party had had the hardihood to embark. Personally I would rather be excused from attempting the Colorado River in any kind of a boat. We went in bathing in some sheltered nooks along the edge; but if we had ventured out twenty feet anywhere, the fifteen-mile current would have transported us bodily to regions unknown. It required some courage to trust one's self even in the edge of it; and no idea can be formed of the intricate system of cross-currents, whirlpools, and breakers that exhibited themselves farther out. The depth of the river is unknown, its width at this point is nearly 300 feet, and the

wall of rock on the opposite side rises nearly sheer 2,000 feet. The stream is visible here for only a very short distance, as the observer is in the mouth of a small box-cañon whose high and apparently inaccessible walls effectually shut off the view both above and below. The river therefore impresses one as emerging from the unknown, and gliding onward into a seemingly more terrible unknown. A photograph was taken of the stream at this point. Then we fished; but the fish did not bite. I fancied they were too busy dodging snags and escaping from cross-currents to give their attention to hooks. The water was muddy, and no fish could be seen except as they flopped out occasionally above the surface. Then we tried to see who could throw a stone across; only one man in the party succeeded. The two botanists now returned to spend the night at the stone cabin and make the climb to the rim the next morning.

Mr. Cordley and myself camped on the sand at the edge of the river two nights, and made serious incursions upon the insect fauna up the side cañon during the daytime. We were deserted by the other three members the next morning. That afternoon, taking off our shoes, we climbed the almost inaccessible wall of rock on the left, or down-stream side, close to the water. After going up some extremely difficult walls of rock, in two or three different places, we reached a point which was probably 300 yards farther down stream than the mouth of our box cañon. Here we had an unimpeded view of the river for quite a long distance comparatively, until it made a bend to the west. We could also see farther up stream, and felt well repaid by the view for the labor it cost us to reach this point and get safely back again. On the following day we collected all the way up to the cabin, which we reached in the afternoon. We pinned insects the rest of the day, and fought jiggers all night, being filled with them from our constant contact with the bush for the last two days. We spent two nights here at the stone cabin, collecting and mounting insects all the next day, and that night we pecked our names in the solid rock near the cabin with a geologist's hammer.

The next morning, Tuesday, July 12, we left the cabin at

7.30 A. M., and reached the rim at 10.30; thus taking just about twice the time in going up that we took in coming down. I carried up a Winchester in addition to my other luggage, and on reaching the top of the rim fired off all the shots that remained in the magazine, seven in number, as fast as I could work the lever. Thus ended our experiences in the Grand Cañon,—experiences which will always live in my memory.

A Map of New England and Eastern New York, locating Prominent Summits.

THE map which appears with the present issue of APPALACHIA (Plate X.) is the first attempt the Department of Topography has made to represent upon one sheet what may be called the Club's natural domain. Its earliest manifesto—the introductory paragraph of APPALACHIA, Vol. I.—declares that “the Club will carry on a systematic exploration of the mountains of New England and adjacent regions, publishing its results from time to time.” The Club maps already published that exhibit original work of members, have been almost entirely confined to the White Mountains and the adjacent district of the State of Maine; in the present map, which is to be regarded as merely preliminary and tentative, the field overleaps the bounds of New England, and takes in the adjacent regions of Eastern New York and the Province of Quebec. Beyond the points taken from the Club's already published work, only the determinations of other accurate surveys have been entered on the new map; and since such surveys have not yet been completed in Quebec, Maine, New Hampshire, Vermont, and New York, it follows that the map is incomplete in those parts.

On the other hand, in some parts of the sheet it has been impossible to plot all the points already determined, or even all that it would be desirable to have appear. The presence of so many names would not merely mar the appearance of the sheet, but would make it in places illegible, thus defeating

the very end in view ; namely, the production of a map which will enable a person upon any leading summit, mountain, or hill in the district covered, to identify other prominent points within the field of vision. Hence discrimination was necessary to reconcile the demands of prominence with clearness of presentation. In general, this task was simple ; but in dealing with the Club's more immediate domain,—the White Mountains, where more than elsewhere the map is likely to be used,—the problem was more complicated, and a special method of treatment was employed.

In this section it will be observed that in addition to the points indicated by triangles—which alone bear names and numbers indicating altitude—there are numerous black dots to which no names are appended. It is believed that any interested member of the Club is sufficiently familiar with the peaks of New Hampshire to enable him to recognize these points at once from their relations to others duly indicated ; again, it is supposed that the map will rather be useful in identifying points *from* these here unnamed summits than in recognizing the summits themselves from other places, though the fact that it also enables one to do this will no doubt enhance its value to many. In selecting from the great number of mountains plotted in the Club maps those that should find a place upon this, special importance was felt to belong to such as mark the limits of the minor ranges, as well as to isolated peaks that the interference of names would make it undesirable to plot in the usual way. Thus, Shelburne Moriah (Bald), Madison, and Hale are located by dots, as indicating the limit in high peaks of their several ranges. Eminences which are overshadowed by much loftier ones in near proximity are omitted. Thus, Clay and Monroe, while they are loftier than many summits that are located, are here omitted, because overshadowed by Mt. Washington. It should be noted with respect to the whole map that the coast line, the lakes and streams, and the town sites have been roughly indicated for convenience only, without pretending to accuracy.

While it may be assumed that members of the Club will understand how to utilize this map, the following suggestion

may perhaps lead to its more extended employment. It will be found interesting and useful, before making an ascent, to pass an hour or so over the map with a pin, thread, and note-book. Reinforce the paper under the location of your peak with a small piece of letter-paper pasted beneath, to prevent tearing; spread the map on a table; press the pin through the centre of the triangle, or dot, which represents the peak you are about to ascend, and loop over it your thread, upon which you have inked marks to make it a scale of miles corresponding to that under the legend. Now, choosing some direction, say south, draw your thread taut, and observe what peaks it passes most nearly, with their elevations and distances, and write these in your note-book. Of course, if the nearer mountains are higher, the remoter have no interest; for they cannot come in view to you when you reach the summit you are proposing to ascend. Now gradually revolve your thread through the 360 degrees, and write down *in order* the peaks you may expect to see, and especially the interesting more distant ones which there is a bare chance of your seeing. Criteria, such as relative distance from two readily recognizable points, will be found especially valuable. Almost any one may contribute to the perfecting of this map in later editions by thus preparing himself, and by reporting discrepancies to the Councillor of Topography; he will also greatly enhance the interest of his prospect from the attained summit.

Appended is such a list, prepared for a future ascent of Black Snout¹ after the obstructing trees shall have been felled. It reads from south through west to north and east. The fourth quadrant is missing, and unnecessary, as the mass of the mountain itself conceals everything in those directions.

¹ As Black Snout is not so satisfactory as the other locations upon the map, — its position being merely indicated by contour lines upon the map of the New Hampshire State Geological Survey, — it will be especially interesting to see whether the view tallies with the list here given. A failure so to do would not, however, reflect upon the accuracy of the present map. — Under the caption "criteria," the fraction indicates the proportionate distance between the two peaks whose names are abbreviated. In every case the first abbreviation indicates a mountain preceding in the list; the second indicates one following. Very doubtful cases are marked with a ?; those nearly in line are within a brace.

66 MAP OF NEW ENGLAND AND EASTERN NEW YORK.

POINTS TO BE DETERMINED FROM THE SUMMIT OF BLACK SNOUT, OSSIPEE MOUNTAIN, N. H.

	Feet.	Miles.	Criteria		Feet.	Miles.	Criteria
Gunstock	2394	19		Carrigain	4701	23	
Uncanoonuc	1333	58		Passaconaway	4116	12	
Joe English		62		Wiley	4313	28	
Rattleanake H.	783	40		Tremont }	3400	19	
Bean Hill	1515	29		Webster }	3923	29	
Pack Monadnock	2280	70		Pleasant	4781	32	
Crotched	2066	62 ($\frac{1}{2}$ P.M.-M.)		Washington	6293	35 ($\frac{1}{2}$ Tr.-Br.)	
Craney Hill	1420	50		Bear		17	
Monadnock	3186	76		Chocoma }	3506	11	
Bald	2039	65 ($\frac{1}{2}$ Cro.-K.)		Wildcat }		34	
Stewart Pk.	1803	45 c.		Carter Dome	4856	35	
Kearsarge	2943	38		Moriah	4065	40	
Sunapee	2683	50 ($\frac{1}{2}$ K.-R.)		North Moat }	3217	18	
Ragged	2256	34		Bald }		41	
Haystack (?)	3464	104 ($\frac{1}{2}$ K.-Croy.)		Ingalls		50	
Melvin	2134	34 ($\frac{1}{2}$ R.-Croy.)		Goose Eye		53	
Equinox (?)	3872	100 (Croydon.)		South Moat }		17	
Croydon	2789	50 ($\frac{1}{2}$ R.-Card.)		North Baldface }		32	
Acutney	3320	61 ($\frac{1}{2}$ Croy.-		Eastman			
Cardigan	3156	32 [Card.]		Bear Riv. Whitecap }		60	
Killington	4360	75 ($\frac{1}{2}$ Card.-		South Baldface }			
Moose	2362	41 [Moose.]		Royce		($\frac{1}{2}$ S.B.-K)	
Prospect		15		Kearsarge }	3270	23	
Stinson		22		Caribou }		43	
Cube		37 ($\frac{1}{2}$ St.-Carr.)		Puzzle }		58	
Carr	3480	27		Saddleback	4000	90	
Moosilanke	4810	31		Abraham	3388	100 ($\frac{1}{2}$ K.-Seb.)	
Black }	3999	12		Blue }	2700	81	
Tecumseh }		17 (behind		Sebatos }		37	
Kinsman	4377	32 [Black.]		Bannock		90 ($\frac{1}{2}$ Seb.-Pl.	
Scar Ridge		23 ($\frac{1}{2}$ Bl.-Osc.)		Pleasant Mount	2021	30	
Osceola	4362	18		Cragged (on State line)		16	
Flume	4340	27		Green	1700	14 (Portland.)	
Lafayette	5289	31		Wiggin	1275	19	
S. Tripyramid		15		Ossipee (Me.)	1050	31	
Whiteface	4057	11					

In testing the map previous to printing it, the schedules of distant points visible from Mt. Washington, compiled by Mr. W. H. Pickering, and published in APPALACHIA, Vol. I. pp. 86 and 192, also Vol. II. p. 147, were found especially valuable. The thread-test showed a very satisfactory agreement with the data therein published. In one instance a very inter-

esting fact came to light. In the first of the schedules mentioned above,¹ we read: "Mt. Greylock; distance 147 miles, position south 40° west, and just over the summit of Mt. Webster." The new map shows its bearing thus with desirable accuracy. But, to the surprise of the examiners, there was found to be directly in line and some thirty miles nearer to Mt. Washington, a peak situated about twenty miles northwest of Brattleboro, Vt., of which no mention has ever been made in our Club, bearing the name of "Haystack," and reported to be only about forty feet less in altitude than Greylock itself! It is duly located, with an indicated altitude of 3,464 feet, on the Wilmington sheet of the United States Geological Survey's map. If then there is no error in either map, it would appear that Greylock must be concealed by this little-known "Haystack," which has hitherto on especially clear days been pointed out as Greylock to visitors to Mt. Washington. It is very possible that other misapprehensions may be righted by the employment of this new map, for which the Club is under special obligation to our Recording Secretary for suggestion, and to our retiring Councillor of Topography for interested execution.

Report of the Recording Secretary for 1892.

- On Jan. 1, 1893, the corporate membership of the Club was 817. The losses amounting to 61, and the accessions 119, the net gain for the year was 58. The Honorary Members numbered 12, John G. Whittier having deceased; the Corresponding Members, 47, — General M. C. Meigs, Lieutenant Frederick Schwatka, and Dr. J. S. Newberry having deceased, and Mr. Emil Huber, Dr. William T. Harris, and Professors I. C. Russell and George Frederick Wright having been added. The total membership was therefore 876, — an increase of 58, the largest for several years. The Life Members numbered 63.
- A "Guest Ticket," conferring complimentary membership for the current year, was approved by the Club in January, 1892; twelve of these were presented during the year just ended.

¹ Cf., however, APPALACHIA, Vol. I. p. 193.

There were held during the year nine regular and two special meetings, and one field-meeting. At these there were presented eight reports and eighteen papers. The White Mountains had six communications, the Middlesex Fells two, and Maine, New York, Canada, and Japan one each. Three other papers were of a general character. Five subjects were illustrated with the lantern.

A successful field-meeting was held at St. Hubert's Inn, Adirondack Mountains, July 1-11; and there was a large camping-party at Grafton Notch in August. The excursion work of the Club has continued to increase, especially in the direction of Saturday afternoon outings, — a feature introduced in 1886 by President J. Rayner Edmands. For a detailed account of the excursions and outings, reference may be made to the report of the Excursion Committee.

The Snow-Shoe Section held its annual meeting in January. There were a few meets in the vicinity of Boston the latter part of the season. During the winter excursion to Waterville, N. H., in February the shoeing was excellent, and several mountain ascents were made.

The annual social meeting was held at the Hotel Vendome, February 12, with an attendance of 164.

A number of APPALACHIA, completing Vol. VI., was published in January. The map of the country about Worcester, from the plates of the United States Geographical Survey, was distributed with this number. A new map of the Middlesex Fells was also issued; and a map of New England and Eastern New York, showing the location of the principal summits, is now ready for distribution. "The Land of the Cliff-Dwellers," a finely illustrated book by Mr. F. H. Chapin, has been recently published under the auspices of the Club.

A Club badge, consisting of a button or pin in black with the letters A. M. C. in green, was adopted by the Council and presented to all members.

Our Club was represented by delegates at a meeting held November 22 at the State Capitol, Concord, N. H., upon the call of the Forestry Commission of that State, to consider what action is desirable toward the preservation of the forests among the mountains and at the head-waters of the princi-

pal rivers. Toward a fund to enable the Commissioners to prosecute this work members of our Club have contributed \$184.00.

The Club has also been interested in the work of the Metropolitan Parks Commission of Massachusetts, especially as regards the preservation of the hills near Boston as public places for the enjoyment of the people; and in order to call the attention of the public and the Legislature to the attractions of the Middlesex Fells, the Club is now erecting upon the summit of Bear Hill in Stoneham a substantial observatory or lookout. We hope soon to dedicate it with a snow-shoe meet, and to invite the Legislative Committee, with or without snow-shoes, to view the Fells from its platform.

Respectfully submitted,

ROSEWELL B. LAWRENCE,
Recording Secretary.

Report of the Corresponding Secretary for 1892.

In the relations of this Club to other similar organizations but few changes have taken place. We have added to our exchange list the Section de Haute Bourgogne of the French Alpine Club, the Milan section of the Italian Alpine Club, the New Zealand Alpine Club, the Sierra Club of California, the United States Coast and Geodetic Survey, and the Department of Agriculture at Washington.

The Club has been represented in Europe the past season by special delegates appointed by the Council, Rev. P. S. Moxom and Mr. P. S. Abbot having been accredited to such meetings of alpine and geographical societies as they might find it convenient and proper to attend. Mr. R. H. Budden, our Corresponding Member resident at Turin, was invited to act as our delegate at the meeting in Genoa of the Geographical Congress held in September in commemoration of the Columbus Anniversary. He attended the meeting to which he was assigned, presented his credentials, and has made a report on the section of the Congress which he attended.

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In that section was discussed the subject of Italian emigration to America. Mr. Budden's communication will be found filed as No. 149 in the Corresponding Secretary's letter-book.

In accordance with the suggestion of my last report, a new book-case has been added to the Club-room, and it was at once filled. Every inch of shelf-room is now occupied, and more must be furnished if all the books are to be kept in sight.

The library now contains 926 volumes, 510 pamphlets, and 1097 maps. In this enumeration of books a plan has been adopted somewhat different from that followed for the past few years. In the number of "volumes" are reckoned all bound books, all sets of magazines belonging to one year, if such magazines have hitherto been bound, and unbound volumes and pamphlets of 150 or more pages. As "pamphlets" are classed miscellaneous publications of less than 150 pages, and magazines belonging to sets none of which have thus far been bound.

The character and number of accessions to the library may be seen by consulting the detailed statement appended to this report.

Respectfully submitted,

FRANK W. FREEBORN,
Corresponding Secretary.

ACCESSIONS TO THE LIBRARY FOR THE YEAR 1892.

FROM CORRESPONDING SOCIETIES.

American.

American Geographical Society. — Bulletin, Vol. XXIII. 4, Parts 1, 2; XXIV. 1-3.

American Museum of Natural History. — Annual Report, 1891.

Cambridge Entomological Society. — Psyche, Vol. VI. 190-200.

Essex Institute. — Bulletin, Vol. XXIII. 7-12; XXIV. 1-6; *Our Trees*, by John Robinson.

Geological and Natural History Survey of Canada. — Annual Report, 1888-89, D. 1-9, N. 1-3; Catalogue of Canadian Plants, VI.

Geological and Natural History Survey of Minnesota. — Annual Report, XIX.

Geological Survey of Missouri. — The Higginsville sheet in Lafayette County.

- Lick Observatory.* — The Lick Astronomical Department of the University of California.
- National Geographic Society.* — Vol. III. pp. 205-261; IV. pp. 1-162.
- New Hampshire State Library.* — Report for 1891.
- New York State Survey.* — Annual Report of New York Forest Commission, 1890.
- Philadelphia Academy of Natural Sciences.* — Proceedings, 1891, Part 3; 1892, Parts 1, 2.
- Smithsonian Institution.* — Annual Report to July, 1890. Smithsonian Miscellaneous Collections; Bibliographical Index to North American Botany, Part 1.
- Torrey Botanical Club.* — Bulletin, XVII. 9; XIX. 1-10, 12.
- United States Department of Agriculture.* — Bulletin New England Weather Service, 1-6, 8, 9.
- United States Geological Survey.* — Mineral Resources of the United States, 1889-90; 208 Atlas sheets; Relief map of the United States.

Foreign.

- Associació d'Excursions Catalana.* — Butlletí, Any XIII. 139-144.
- Club Alpin Français.* — (*Direction Centrale*) Annuaire, XVIII.; Bulletin, 1891, 9; 1892, 1-8; Table générale des quinze premières années de l'annuaire. (*Section des Alpes Maritimes*) Bulletin XII. (*Section du Sud-Ouest*) Bulletin, 30, 31, Table Alphabétique. (*Section Lyonnaise*) Bulletin VIII.
- Club Alpino Italiano.* — (*Direzione Centrale*) Bollettino, XXV. 58; Rivista Mensile, X. 12; XI. 1-11; (*Sezione di Milano*) Annuario, 1890-92; (*Sezione di Roma*) Annuario, Vol. III.
- Club Alpin Suisse.* — (*Comité Central*) Jahrbuch, XXVII. Beilagen zum Jahrbuch, XXVII.; (*Section Romandes*) L'Écho des Alpes, 1891, 4; 1892, 1-3.
- Deutscher und Österreichischer Alpenverein.* — Mittheilungen, 1891, 23, 24; 1892, 1-22; Zeitschrift, XXIII.
- Kruimskit Gornuit Klub.* — Bulletin No. 1.
- Magyarországi Karpát-egyesület.* — Jahrbuch, XIX.
- New Zealand Alpine Club.* — New Zealand Alpine Journal, Vol. I. 1.
- Norske Turistforening.* — Årbog, 1891-92.
- Österreichischer Alpen-Club.* — Österreichische Alpen-Zeitung, XIV. 339-363.
- Österreichischer Touristen-Club.* — Österreichische Touristen-Zeitung, X. 3, 4, 22-24; XI. 1-5, 18, 24; XII. 1, 4-10, 14-24.
- Siebenbürgischer Karpathenverein.* — Jahrbuch, XII.
- Società Alpina Friulana.* — In Alto, III. 1-3, 5, 6.
- Société des Touristes du Dauphiné.* — Annuaire, XVII.
- Svenska Turistförening.* — Årsskrift, 1892; Cirkulär.
- Gesellschaft für Erdkunde (Berlin).* — Verhandlungen, XVIII. 7-10; XIX. 1-7.

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- Imperatorskoye Russkoye Geographicheskoye Obshtchestvo.* — *Izvestiya*, XXVII 5, 6; XXVIII. 1-3.
- Kais.-Königl. Geographische Gesellschaft.* — *Mittheilungen*, N. F. XXIV.
- Kais.-Königl. naturhistorisches Hofmuseum* (Vienna). — *Annalen*, Bd. VI. 3, 4; VII. 1, 2.
- Nederlandsch Aardrijkskundig Genootschap.* — *Tijdschrift*, Deel VIII. 8; IX. 1-6.
- Royal Geographical Society.* — *Proceedings*, Vol. XIV. 1-12.
- Sociedad Geografica* (Madrid). — *Boletin*, Tomo XXVIII. 1-3; XXIX. 5, 6; XXXI. 4-6; XXXII. 1-6; XXXIII. 1-3.
- Sociedade de Geographia* (Lisbon). — *Boletim*. 10^a Ser. 1-12; 11^a Ser. 1, 2.
- Società Geografica Italiana.* — *Bollettino*, IV. 12; V. 1-9.
- Société de Géographie* (Paris). — *Bulletin*, and *Comptes Rendus*, 1884-91; *Comptes Rendus*, 1892, 7-16.
- Société de Géographie Commerciale* (Bordeaux). — *Bulletin*, 1891, 22-24; 1892, 1-21.
- Société de Géographie Commerciale* (Paris). — *Bulletin*, Tome XIII. 4; XIV. 1-4.
- Société de Géographie* (Tours). — *Revue*, 1891, 3; 1892, 1-7.
- Société Royale de Géographie d'Anvers.* — *Bulletin*, Tome XVI. 2-4.
- Société Khédiviale de Géographie.* — *Bulletin*, Sér. III. 7-9.
- Teikoku Daigaku* (Imperial University, Tokio). — *Calendar*, 1890-1; 1891-2; *Journal of the College of Science*, Vol. IV. 2; V. 1, 2.
- Verein für Erdkunde* (Leipsic). — *Mittheilungen*, 1891.
- Verein für Erdkunde an der Universität Wien.* — *Bericht über das XVII. Vereinsjahr.*

OTHER EXCHANGES.

- Goldthwaite's Geographical Magazine.* — Vol. III. 1, 2, 6; IV. 1-6.
- Revue Géographique Internationale*, Vol. XVI. 192-94; XVII. 195-203.
- White Mountain Echo.* — Vols. XII., XIII.

DONATIONS.

- Report of Forestry Commission of New Hampshire for 1891. Gift of *J. B. Walker*.¹
- Discovery of Humboldt Bay, California. Gift of *George Davidson*.
- The Clubs of Boston. Gift of Publishers.
- The Business of Travel. W. Fraser Rae. Gift of Publishers.
- Chronological History of Plants. Charles Pickering. Gift of *E. C. Pickering*.
- Himalayan Journals. *Sir J. D. Hooker*. Gift of Author.
- Illustrated Europe: The Lake of Lucerne. J. Hardmeyer. Gift of *T. T. Woodruff*.
- Introduction to Ancient and Modern Geography. J. A. Cummings. Gift of Miss Luce.
- School Atlas of Cummings's Ancient and Modern Geography. J. A. Cummings. Gift of Miss Luce.

¹ Names of members of the Club are in italics.

- Topographical Map of Spot Pond and Vicinity. Gift of *W. H. Cades*.
 Annual Report of the Trustees of Public Reservations. Gift of *Charles Eliot*.
 Mount St. Elias and its Glaciers. *I. C. Russell*. Gift of Author.
 Height and Position of Mount St. Elias. *I. C. Russell*. Gift of Author.
 Origin of Gravel Deposits beneath Muir Glacier. *I. C. Russell*. Gift of Author.
 Meteorologische Beobachtungen auf dem Gipfel von Pike's Peak. *J. Hann*.
 Le Gouffre du Puits de Padirac. *E. A. Martel*. Gift of Author.
 Le Linththal et le Tödi. *Aline Martel*. Gift of *E. A. Martel*.
 Géologie des Grottes et des Eaux Souterraines. *L. de Launay et E. A. Martel*. Gift of *E. A. Martel*.
 Nouveaux Rochers des Causses, etc. *E. A. Martel*. Gift of Author.
 Sous Terre. *E. A. Martel*. Gift of Author.
 Les Causses du Languedoc. *E. A. Martel*. Gift of Author.
 Middlesex Fells. *R. B. Lawrence*.
 Register of the Appalachian Mountain Club, 1892.
 APPALACHIA, VI. 4.
 Geography for Children. *L. du Fresnoy*. Gift of *T. T. Woodruff*.
 Royal Scottish Geographical Magazine, Vol. VIII 1-12. Gift of *Mrs. J. H. Thorndike*.
 Alpine Journal, Vol. XVI. 115-118; Index to Vols. I-XV. Gift of *Mrs. J. H. Thorndike*.
 Outing, Vol. XIX. 5, 6; XX. 1-6; XXI. 1-3. Gift of *Mrs. J. H. Thorndike*.
 The Pacific Coast Scenic Tour. *H. T. Finck*. Gift of *Mrs. J. H. Thorndike*.
 Appendix to Bulletin for 1890 of the New England Meteorological Society and Astronomical Observatory of Harvard College, and United States Signal Service. Gift of Observatory.
 Les Katavothres du Péloponèse. *E. A. Martel*. Gift of Author.
 The Gypsy Moth: Special Report of State Board of Agriculture. Gift of State Board of Agriculture.
 Le Tindoul de la Vayassière. *E. A. Martel* and *G. Ganpillat*. Gift of *E. A. Martel*.
 Climatic Changes indicated by the Glaciers of North America. *I. C. Russell*. Gift of Author.
 Report of United States Coast Survey, 1852, '53, '55. Gift of *E. E. Hale*.
 Reports of Explorations and Surveys for a Railroad Route from the Mississippi River to the Pacific Ocean, 1855, '56, '57. Gift of *E. E. Hale*.
 Aperçu des Principales Communications relatives à la Linguistique faites au Congrès International des Américanistes. *Désiré Pector*. Gift of Author.
 The Aneroid Barometer. Professor Plympton. Gift of *H. C. Parker*.
 How to use the Aneroid Barometer. *Edw. Whymp*. Gift of *H. C. Parker*.

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- John Cabot's Landfall in 1497, etc. E. N. Horsford. Gift of T. T. Woodruff.
- Notes on the Shuswap People of British Columbia. G. M. Dawson. Gift of Author.
- Notes on certain Implements, Weapons, etc., from British Columbia. Alex. Mackenzie. Gift of G. M. Dawson.
- Report of New Hampshire Forestry Commission, 1885, 1891. Gift of Commission.
- Proceedings and Transactions of Nova Scotian Institute of Science, 2d Series, Vol. I. Part 1. Gift of Institute.
- Annals of Astronomical Observatory of Harvard College, XXX. 3; XXXI. 1; XL. 1. Gift of Observatory.

· PURCHASED.

- California Flora. Volney Rattan.
- The Story of the Hills. H. N. Hutchinson.
- With Axe and Rope in the New Zealand Alps. G. E. Mannering.
- Wanderings of a Pilgrim in the Shadow of Mont Blanc. G. B. Cheever.
- An Ascent of Mont Blanc. Charles Hudson and E. S. Kennedy.
- Tour of Mont Blanc and of Monte Rosa. J. D. Forbes.
- The Fern World. F. G. Heath.
- Dictionary of the English and German Languages. I. E. Wessely.
- International English and French Dictionary. Smith, Hamilton, & Le Gros.
- Synopsis of the North American Lichens. Edward Tuckerman.
- A Girl in the Karpathians. M. M. Dowie.
- Land of the Lingering Snow. Frank Bolles.
- Travels amongst the Great Andes of the Equator. Edward Whymper.
- Our Life in the Swiss Highlands. J. A. Symonds.
- The Flora of Switzerland. A. Gremli.
- Two Summers in Greenland. A. R. Carstensen.
- The First Crossing of Greenland. F. Nansen.
- Atlas of the State of Maine. George N. Colby, Publisher.
- Doldenhorn and Weisse Frau. A. Roth.
- Tour in the Himalayas. William Lloyd and Alexander Gerard.
- Illustrations of the Passes of the Alps. 2 vols. William Brockedon.
- Mountaineering. C. T. Dent.
- Numbered Check-List of North American Plants north of Mexico. H. N. Patterson.
- Trees of the Northern United States. A. C. Aggar.
- Catalogue of Musci and Hepaticæ of North America north of Mexico. Clara E. Cummings.
- In Lynn Woods with Pen and Camera. N. M. Hawkes.

Treasurer's Report for 1892.

RECEIPTS FOR THE YEAR.

Cash on hand, Jan. 1, 1892	\$1,050.24	
Life-Memberships: Harlan P. Amen, Eugene B. Hagar, John T. Alden, Charles N. Cutler, Mrs. C. M. Cleveland, William A. Seward, Miss M. B. Lucas, Miss A. S. Johnson, Marcus M. Packer, Fred. E. Harwood,— 10 at \$30	300.00	
Admission fees :		
From 112 new members at \$5	\$560.00	
Assessments from 5 members for. 1891.		
" " 610 " " 1892.		
" " 3 " " 1893.		
Total . . 618 at \$3	1,854.00	
Interest :		
On Permanent Fund to Jan. 1, 1892	\$95.56	
On Treasurer's Bank account	30.78	
	<u>126.29</u>	
Donation :		
From a member	.50	
Field Meetings and Excursions:		
From Excursion Committee	70.58	
Sales of APPALACHIA and other Publications :		
For sales of APPALACHIA	\$80.12	
Advertisement in vol. vi. No. 2	10.00	
Sales of Maps	535.10	
	<u>625.22</u>	
Total Income	3,236.59	
	<u><u>\$4,586.83</u></u>	

PAYMENTS.

To Trustees of the Permanent Fund,		
For 10 Life-Memberships	\$300.00	
For interest on the Fund to Jan. 1, 1892,		
voted by the Club Jan. 13, '92	95.56	
	<u>\$395.56</u>	
To Trustees of the Reserve Fund,		
For appropriation by the Council, January, 1893	200.00	
	<u>\$595.56</u>	
Postage and stationery	\$216.58	
Printing and advertising	\$132.44	
Club Register for 1892	89.70	
	<u>222.14</u>	
Clerical services	197.50	
Expenses of meetings	120.72	
Annual Reception	13.23	
Amounts carried forward	\$770.17	\$595.56

<i>Amounts brought forward</i>	\$770.17	\$595.56
Library :		
For books	\$47.45	
For binding	54.61	
Botanical books, etc.	\$14.19	
Less amount received by sale of articles left from Botan- ical Exhibition, 1891	2.80	
	11.39	
		113.45
Room, at No. 9 Park Street :		
For rent	\$400.00	
For rent of storeroom 9 months	36.00	
For care	40.00	
For bookcase and shelves	45.70	
For gas	4.55	
For sundries	7.83	
	534.08	
APPALACHIA, and other Publications:		
For vol. vi. No. 4	\$370.53	
For delivery of the same	53.27	
For Index, vol. vi.	8.00	
For vol. vii. No. 1	4.40	
For expenses	55.60	
For mounting maps	21.17	
For printing maps of New Eng. Mountains	63.00	
For re-printing 100 copies each of five back numbers of APPALACHIA	383.92	
	1,059.89	
Donations:		
To Trustees of Public Reservations	\$25.00	
Boston Herald N. H. Forestry Fund	25.00	
Expenses of Delegates to a meeting at Concord of the N. H. Forestry Commis'n	11.34	
	61.34	
Expenses:		
Club badges	68.76	
Department of Improvements :		
For paths and records	46.60	
Department of Topography:		
For work on Map of Mountain Locations in New England and E. New York	\$84.00	
For 2,000 maps of Middlesex Fells	122.33	
For work on map of Muddy Pond Woods	10.00	
	216.33	
Department of Natural History:		
For meteorological instruments	82.25	
<i>Amounts carried forward</i>	\$2,902.87	\$595.56

TREASURER'S REPORT.

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<i>Amounts brought forward</i>	<i>\$2,902.87</i>	<i>\$595.56</i>
Department of Art:		
For photographs and album	21.38	
Total expenses		<u>\$2,924.25</u>
		3,519.81
Cash on hand Dec. 31, 1892		<u>1,067.02</u>
		<u>\$4,586.83</u>

Respectfully submitted,

JOHN E. ALDEN,
Treasurer.

Boston, Jan. 9, 1893.

The undersigned have examined the accounts of the Treasurer of the Appalachian Mountain Club, for the year 1892, and find them correct, with proper vouchers for all payments. We have verified the cash on hand, amounting to \$1,067.02.

CHARLES H. FRENCH,
CHEEVER NEWHALL, } *Auditors.*
FRANK R. CORDLEY,

RECEIPTS FOR FIRST SEVENTEEN YEARS.

Year.	MEMBERSHIPS.					Life Membership.	Sales of APPALACHIA and other publications.	Interest.	Annual Reception.	Paid Meetings and Excursions.	Donations.	Total.
	Admission Fees.	Yearly Assessments.	Back Assessments.	Advance Assessments.	Total.							
1876	252.00	....	....	....	252.00	....	43 13	....	....	....	....	295.18
1877	50.00	254.00	8.00	....	312.00	....	98.00	....	....	....	....	410.00
1878	54.00	254.00	....	....	318.00	50.00	75.70	....	....	....	43.00	496.70
1879	148.00	256.00	40.00	4.00	448.00	....	130.85	....	....	....	221.70	802.45
1880	178.00	332.00	24.00	4.00	538.00	90.00	116.30	1.90	....	....	86.21	841.90
1881	222.00	384.00	13.00	12.00	631.00	120.00	141.40	10.79	....	....	62.55	977.54
1882	254.00	528.00	74.00	....	856.00	90.00	309.43	17.59	....	....	2.00	1281.50
1883	395.00	1000.00	20.00	27.00	1442.00	210.00	197.58	22.07	9.72	82.88	22.00	2008.90
1884	285.00	1052.00	21.00	9.00	1374.00	60.00	93.51	53.29	26.80	11.47	1.00	1620.07
1885	375.00	1212.00	69.00	12.00	1668.00	63.00	113.19	61.09	45	70.73	594.50	2507.96
1886	429.00	1317.00	90.00	24.00	1857.00	330.00	247.40	88.62	12.50	124.85	364.20	3024.61
1887	385.00	1491.00	90.00	42.00	2008.00	180.00	183.80	79.94	10.00	40.20	114.00	2615.34
1888	355.00	1593.00	117.00	12.00	2070.00	180.00	67.06	42.52	9.20	45.94	754.78	3119.48
1889	655.00	1617.00	69.00	27.00	2368.00	120.00	93.85	151.20	11.48	....	127.60 ¹	2872.22
1890	450.00	1620.00	24.00	15.00	2109.00	150.00	1108.13	217.12	3.73	....	220.85	3368.63
1891	500.00	1743.00	12.00	9.00	2264.00	120.00	354.28	182.54	....	146.27	20.00	3087.09
1892	560.00	1830.00	15.00	9.00	2414.00	300.00	625.22	126.29	....	70.58	.50	3536.59
Total	5546.00	16443.00	691.00	206.00	22886.00	2070.00	4059.97	1094.17	83.88	592.42	2574.87	33361.81

¹ Including \$8.00 for keys.

EXPENDITURES FOR FIRST SEVENTEEN YEARS.

Year.	Permanent Fund.	Reserve Fund.	Stationery, Postage, and Printing.	APPALACHIA and other Publications.	Department of Topography.	Improvements and Explorations.	Natural History and Art.	Clerical Expenses.	Expenses of Meetings.	Library.	Club Room.	Donations.	Total.
1876	.....	.....	106 91	14 13	.....	15 00	.....	.....	.....	.....	.....	.....	265.77
1877	.....	.....	66 55	34 13	.....	.....	12 45	.....	.....	.....	.....	.....	438.23
1878	.....	.....	202 31	146 46	2 49	39 00	52 48	.....	.....	.....	.....	.....	446.56
1879	60 00	.....	162 31	34 92	15 39	154 75	.....	.....	.....	.....	.....	.....	749.19
1880	90 00	.....	195 17	21 13	14 00	72 00	.....	.....	.....	.....	.....	.....	695.80
1881	120 00	.....	224 00	24 23	37 36	65 50	.....	19 73	22 70	.....	.....	.....	908.72
1882	90 00	.....	224 44	675 43	25 46	.....	.....	34 59	25 00	.....	.....	.....	1109.82
1883	281 72	.....	286 73	36 27	23 66	197 37	.....	67 41	1 38	69 75	.....	.....	1269.21
1884	113 42	.....	392 49	1176 53	.....	21 00	.....	57 62	.....	58 10	.....	.....	1909.16
1885	86 44	.....	393 27	31 31	229 00	102 00	.....	1 00	53 36	72 50	284 17	25 00	1682.79
1886	270 00	.....	422 38	522 91	77 73	46 00	74 00	121 45	171 15	131 72	667 30	49 88	2974.82
1887	280 38	1000 00	286 38	698 71	536 97	123 02	39 12	107 12	145 45	102 50	504 51	.....	3786.46
1888	280 00	100 00	473 86	597 59	.....	779 55	5 22	45 57	93 45	127 56	465 12	.....	2869.04
1889	220 00	114 79	339 77	1127 91	7 20	118 58	86 76	123 75	68 35	67 33	487 34	.....	2812.20
1890	283 48	48 59	468 43	1682 86	.....	46 07	101 56	181 00	58 35	96 00	464 96	.....	3426.44
1891	36 04	695 71	369 27	833 17	50 00	123 00	45 39	191 50	121 60	117 10	471 69	106 37	3869.24
1892	36 56	290 00	438 72	1669 39	216 33	46 60	122 38	197 50	133 96	113 45	534 08	61 34	3519.81
Total	2984 68	2069 00	5387 82	10968 24	1246 43	1900 55	524 44	1257 10	894 95	949 10	3870 46	241 52	32294.29

Report of the Trustees of the Permanent and Reserve Funds for 1892.

PERMANENT FUND. — PRINCIPAL.

1892.

January 13.	Amount on deposit in Suffolk Savings Bank	\$1,372.66
	Amount on deposit in Provident Institution for Savings	1,060.52
	Amount on deposit in Lexington Savings Bank	255.50
		<u>\$2,688.68</u>

Amounts received from J. E. Alden, Treasurer, for Life-Membership are:

January 13.	Harlan P. Amen	\$30.00
"	Eugene B. Hagar	30.00
" 28.	John T. Alden	30.00
"	Charles N. Cutler	30.00
" 30.	Mrs. C. M. Cleveland	30.00
March 14.	William A. Seward	30.00
May 31.	Miss Martha B. Lucas	30.00
	Amounts carried forward	<u>\$210.00</u> <u>\$2,688.68</u>

TRUSTEES' REPORT.

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<i>Amounts brought forward</i>		\$210.00	\$2,688.68
June 9.	Miss Almira S. Johnson	30.00	
November 11.	Marcus M. Packer	30.00	
" 21.	Fred E. Harwood	30.00	
			<u>300.00</u>
Total Principal on hand Jan. 11, 1893			<u>\$2,988.68</u>

PERMANENT FUND. — INTEREST.

Interest on deposit in Provident Institution for Savings for six months to January, 1892	\$21.20	
Interest on same for six months to July, 1892	21.62	
Interest on deposit in Suffolk Savings Bank for six months to April, 1892	27.44	
Interest on same for six months to October, 1892	28.00	
Interest on deposit in Lexington Savings Bank for six months to April, 1892	5.99	
Interest on same for six months to October, 1892	11.02	
Total Interest on hand Jan. 11, 1893, and subject to action of the Club		\$115.27
Total Permanent Fund, Principal and Interest		\$3,103.95

RESERVE FUND.

1892.			
January 13.	Amount on hand as per last account, loaned to Massachusetts Loan and Trust Co.	\$1,313.82	
	On deposit in Five Cents Savings Bank	555.18	
			<u>\$1869.00</u>
May 6.	Interest on deposit in Five Cents Savings Bank for six months to April, 1892	\$11.10	
November 25.	Interest on same for six months to October, 1892	11.32	
	Interest on Loan to Massachusetts Loan and Trust Co., one year at 4%	52.55	
			<u>74.97</u>
1893.			
January 7.	Amount appropriated by vote of Coun- cil, Jan. 6, 1893	200.00	
	Total Reserve Fund on hand Jan. 11, 1893		<u>\$2,143.97</u>

RECAPITULATION.

Total Permanent Fund	\$2,988.68	
Interest on same subject to the action of the Club	115.27	
Total Reserve Fund on hand Jan. 11, 1893	<u>2,143.97</u>	
Total amount reported by the Trustees		\$5,247.92
Wm. H. NILES, ISAAC Y. CHUBBUCK, REST F. CURTIS, } Trustees.		

Boston, Jan. 11, 1893.

Reports of the Councillors for the Autumn of 1892.

Natural History.

BY WARREN UPHAM.

DURING the past year the work of the Club in this Department has been chiefly for meteorology and botany, in both of which we have taken important steps of progress.

Three additional meteorologic stations have been equipped with instruments by our Club, as an aid to the New England Weather Service, of which Mr. J. Warren Smith is director, in association with the station of the United States Weather Bureau in the Post-Office Building, Boston. Previous to this year we had thus equipped six stations, under the auspices of the New England Meteorological Society. These stations and the publication of their observations were transferred last spring to the New England Weather Service. The three new stations, like the preceding, are in the mountain region of New Hampshire, being at Lancaster, Bethlehem, and Dublin, the two former close to the White Mountains, and the last at the northeastern base of Monadnock. The equipment for each station comprises maximum and minimum thermometers, costing \$6.50, and a rain-gauge, of the kind recommended by the United States Weather Bureau, costing \$4.00. The observers at these stations are Mr. J. D. Howe, Lancaster; Mr. Benjamin Tucker, Bethlehem; and Mr. Henry D. Allison, Dublin. The last was recommended to us through the kindness of Colonel T. W. Higginson. Former reports concerning the stations earlier established by our Club are

in APPALACHIA, vol. v. pp. 71, 143, and vol. vi. pp. 256, 338. The records at these stations, with those of 160 other observers in various parts of New England, are given in reports which are supplied to our Club Library from year to year. It seems very desirable that many other meteorologic stations shall be added to this number, especially in the mountainous portions of Maine, New Hampshire, Vermont, and western Massachusetts; and your Councillor recommends that the Club continue for some years to equip one, two, or three new stations yearly.

Much work has been given to the Club Herbarium by Miss Julia C. Clarke, Miss Agnes W. Lincoln, and other members, through whose interest and efforts several valuable accessions of dried plants have been received, and the collections have been mostly mounted, labelled, and placed in suitable condition for examination and study. Sufficient space beneath one of the library cases in the Club-room has been appropriated for the Herbarium, which now contains a nearly complete set of the alpine and subalpine plants of the White Mountains, and some representation of the floras of other parts of New England and the United States, Europe, and Palestine. There is need, however, for the insertion of shelves to allow a more convenient arrangement of the specimens under their families and genera. Members and friends of the Club having opportunities to collect plants in any part of New England, or on mountains in any part of the world, are most cordially invited to make contributions to this Herbarium.

The pleasure of a journey or sojourn among mountains is much increased by observations of their geology, fauna, flora, and meteorology. Mutual help and incentive to enthusiasm will be found, if members will keep memoranda of such observations and transmit copies of them for the records of this department of the Club.

For any who have not previously given special attention to these subjects, preliminary reading will be useful; and some of the text-books or manuals of these branches of science may be advantageously taken for their company and aid during the time spent in mountaineering.

In geologic observations it is very desirable that a map of the district explored should be marked to show the locations of the diverse rock formations, their dips, the courses of dikes, directions of glacial striæ, extent and character of the various drift deposits, etc., and that at least a few specimens, typical of the principal formations within the area, should be collected.

The Councillor will be glad to give, by correspondence, more definite suggestions, and references to literature on the Natural History of our various mountain districts.

Reports of the Councillors for the Autumn of 1892.

Topography.

BY CHARLES ELIOT.

IN the last report of this Department mention was made of two maps which it was hoped might be issued during the year 1892. The first was the new map of the Middlesex Fells by Messrs. Lawrence and Chubbuck, which was sent to Club members with APPALACHIA, vol. vi. No. 4. The second was a map which was intended to show upon a scale of one one-millionth (or 15.78 miles to an inch) the position of such of the most prominent summits of New England as have been accurately located and published. Your Councillor has given much time to a study of the national and State topographical maps of New England, for the purpose of selecting the points to be shown on the comparatively small scale of the new map. He has also superintended the draughting of the three hundred and fifty or more points so selected. In the White Mountain region a number of supplementary points, selected by Messrs. Fay and Edmands, have also been inserted, in order that those who climb even the lesser of our highest hills may use the map as a help to the identification of distant points.

It is true that until modern accurate surveys shall have been carried into all parts of New England, this map must

present a blank in many quarters. It is also true that it is nearly impossible to collate and draught as many facts as this map presents without making some errors. On the other hand, I believe that, even with its imperfections, the new map will prove interesting to all who climb the hills of New England. I have only to add that although it cannot now appear in 1892, it is in print, and will be distributed to members of the Club with the next issue of APPALACHIA.

Reports of the Councillors for the Autumn of 1892.

Exploration.

BY ARTHUR L. GOODRICH.

IN the Appalachian circular for the meeting of June 8, the Councillor of Exploration called the attention of the Club to certain minor details that needed working up in the White Mountain region, and invited the members to "forward accounts of their visits to all places outside of the track of the ordinary tourist." An immediate response was received from Mr. E. B. Cook, of Hoboken, N. J., calling the attention of the Councillor to several points which had escaped him, and also pointing out the fact that Mts. Thompson and Hastings had been examined already. Aside from the above, no communication has been received.

Your Councillor was prevented, by pressure of necessary work in another affair, from making several trips which he had in mind. He had leisure to clear up one small matter only, — the region between Whiteface and Black Mountain, in the Waterville district. This is referred to in a note below. Any communications which may come to hand will be reported later. Attention will be called, in the spring, to the regions pointed out by Mr. Cook.

**THE REGION INCLUDED BETWEEN BLACK MOUNTAIN, WHITEFACE,
AND SOUTH TRIPYRAMID. BY A. L. GOODRICH.**

From Q. 6. 5, the first swell of the main ridge south of the South Tripyramid (Q. 6. 4), a long subordinate ridge runs away to the west and curves round to the north, ending in the flats of "Beckytown" in Waterville. From Q. 6. 6, the second similar swell, another ridge makes off in the same manner and ends in Snow's Mountain. The valley between the two is drained by Cascade Brook. The ridge last mentioned divides shortly after leaving Q. 6. 6. If the shallow valley between the two divisions be followed out to the west, the tourist comes presently (in perhaps two miles) to a point where the whole valley breaks down into the large semi-circular basin drained by Snow's Brook. At the same point, however, a gap to his left will let him over the ridge into the depression in which lies Flat Mountain Pond.

Flat Mountain itself (the Waterville Flat Mountain) is a flat-topped, low summit standing between the Flat Mountain Pond depression on its southeast and the basins drained by Snow's and Drake's brooks on the north and west. Between it and the summit of Black Mountain there is a rather sharp but not very deep gap.

By comparing this description with Professor Fay's statements made in APPALACHIA, vol. vi. No. 4, it will be seen that Kancamagus, the Tripyramids, Whiteface, Passaconaway, and Black Mountain all belong to the same mountain mass.

Reports of the Councillors for the Autumn of 1892.

Improvements.

BY RICHARD B. GROVER.

THE health of your Councillor was such as to make it advisable for him to pass a part of the summer abroad; hence the work accomplished by the Department has fallen far short of what he anticipated at the beginning of the season. The most that has been accomplished has been the opening of one or two new paths, and the clearing and repairing of a few old ones.

Owing to the great interest of Mr. E. B. Cook, a new path has been constructed from Randolph Hill to the peaks of Crescent Mountain. This path divides on reaching the summit ridge, one branch leading to the "Southern View" overlooking the Presidential range, and the other to the "Northern

Outlook," toward the Pliny and Pilot ranges. Very near the ridge the path passes a refreshing spring. In 1889 Mr. Cook opened a new path to Mt. Madison, called by him the "Ridge-way Path." It is spoken of in this connection, as no mention of it has previously appeared. "The path starts from the Ravine House, and follows the Air Line," says Mr. Cook, "for $1\frac{1}{4}$ miles, to a signboard which indicates a cut off to the old Mt. Madison path, which is followed to a few yards beyond the $1\frac{1}{4}$ mile sign, whence a straight course is pursued till the Madison Brook is crossed; thence the same straight course is continued up the ridge-way; $\frac{1}{3}$ of a mile beyond the tree-line the new route intersects the old path." Considerable distance is thereby saved, and the steepness of the old route avoided. Mr. Cook also writes that a statement in the January number of APPALACHIA (vol. vi. p. 349) is "defective," and desires that the Councillor should say a word regarding it. This statement refers to a painted trail over the Northern Peaks, and conveys the impression that it extends no farther than the col between Jefferson and Clay; while the fact is that it continues over the summit of Clay to the Mt. Washington Railroad, striking it about $\frac{1}{2}$ mile below the summit of Washington. This trail, chiefly located by Mr. Charles E. Lowe, was completed in May, 1891. Perhaps it should be stated also that the trail was constructed without expense to the Club.

Several of the paths on the north side of Mt. Adams — viz., Lowe's path to the summit, the branch from Lowe's beginning at 2. K. 4, and leading through King's Ravine to the Gateway, the Air Line path, and the King's Ravine branch from the same, the path from the Mt. Adams Camp to the Lower Cascade, and the branch from Hunt's path to the Upper Cascade — have all been put in excellent condition, the work being performed by Mr. Hubbard Hunt at an expense to the Club of \$20. The Scar path, the Bruin Rock path, and the path to the Ice Gulch have also been put in thorough repair. The "spotted trail" to the Pond of Safety (opened by Mr. Peek in 1890), much confused by new wood-roads, has been clearly indicated by nailing up bits of tin throughout its entire length.

Mr. W. G. Nowell has expended much time and strength upon the Mt. Adams trails above timber-line, and has con-

structed a line of cairns from the $3\frac{1}{2}$ mile board on the Air Line path to the junction of Lowe's path with the Mt. Washington trail mentioned above. "This enables travellers over the range to avoid the cone of Adams when prudence or comfort render a direct and expeditious passage to or from the Stone Hut desirable." So writes Mr. Nowell.

It is hoped and strongly urged that members of the Club will refrain from making any use whatever of the scrub growth within several hundred feet of Madison Spring, as there is great danger of the latter being injured. The Councillor is informed that this growth is disappearing far too rapidly. Dry fuel and boughs in abundance can be obtained to the north of the Club hut.

Record cylinders have been placed on Mt. Bigelow and Snow Mountain in Maine, and the old glass bottle at the lower Castle (Mt. Jefferson) has been removed and a metal cylinder placed in its stead.

The thanks of the Councillor are due to those members of the Club who so kindly responded to the inquiries of the April circular, and have thus aided in the work of securing more accurate records for the department.

In closing, the Councillor desires to add that it is hoped by many members of the Club that at no distant day all paint-trails (which are utterly useless on the least fall of snow) will disappear altogether on the higher summits of the Presidential range, and their courses be indicated by cairns. Suggestions to this effect have been presented by two former Councillors. The first cost of erecting these cairns would, of course, be considerable; but once in place and properly constructed, they would stand many years.

There is much that might be said on both sides of the general subject of trails on the higher summits of the White Mountains. Some members feel that they ought to be discarded entirely, as they seem to encourage inexperienced persons in undertaking excursions without proper precaution or without intelligent and well-informed guides. It may not be possible for the Club to prevent trails being made; but it is possible for it to decline to have any hand in such work, and thereby be exempt from all responsibility in encouraging un-

initiated tourists to undertake excursions which are always attended with greater or less peril. If trails are to be maintained, then (in the judgment of your Councillor) the cairn should be erected. Let us not longer disfigure the grand solitudes and sanctuaries of Nature with daubs of paint.

Reference to the Bear Hill Observatory, about to be erected by the Club, will be found in the report of the Recording Secretary. Attention is also called to the appended communication from Mr. Francis Blake.

THE PATH FROM THE GLEN HOUSE TO MT. MADISON. BY FRANCIS BLAKE.

A large part of the path from Osgood's Bridge to the summit of Mt. Madison having been obliterated by the logging operations of 1887 and subsequent years, a new path was cut in September, 1891, under the writer's direction, by a gang of men generously assigned to that duty by the proprietors of the Glen House.

About four minutes' walk from Osgood's Bridge, the new path by an abrupt turn to the left enters a logging-road, which is followed to its junction with Osgood's old path about half-way up the wooded slope of Madison. Thence to "Madison Ledges," the old path has been re-blazed and cleared of fallen trees.

The grade of the logging-road section is much less than the grade of the old path, for which it is a substitute.

Following is the record of the first ascent of Mt. Madison by the new path, September 15, 1891. There was no attempt to "make time;" and it is believed that any middle-aged pedestrian in fair condition can do as well.

Station.	Altitude.	Time.	
	Feet.	h.	m.
Glen House	1632	9	50
Osgood's Falls	1780	10	20
On logging-road	2480	10	51
Junction with old path	2880	11	8
On old path	3330	11	22
" "	3930	11	37
Madison Ledges	4280	11	49
Madison Summit	5381	12	50

The altitudes of Glen House and Madison Summit are those adopted by Professor E. C. Pickering, *APPALACHIA*, vol. iv. p. 321; the intermediate altitudes have been deduced from readings of a pocket aneroid barometer, "L. Casella, London, No. 4286, Compensated." The altitude of Madison Summit by this instrument was 5,450 feet, differing only 69 feet from Professor Pickering's adopted value.

Report of the Excursion Committee for 1892.

THERE have been during the year ten excursions, forty-four outings (eight of which were for all day), one snow-shoe outing, and two snow-shoe excursions, — in all fifty-seven excursions and outings, a greater number than in any preceding year. Only three Saturdays have been unprovided for.

On Fast Day, April 7, one hundred and sixteen members and friends walked over the BLUE HILLS, following nearly the same route taken by the party of the previous year.

April 23 was the day chosen for the "Mayflower walk," and PLYMOUTH, Mass., the locality; notwithstanding the threatening weather, ninety-nine made the trip, and found an abundance of flowers.

On May 14 the Annual May walk was taken by a party of sixty-seven. The route was from Canton Junction to SHARON, the Rev. Mr. Merriam acting as leader.

From May 28 to June 1 seventy-two representatives of the Club found pleasant quarters at the SHIRLEY HILL HOUSE, N. H. The places of interest visited were the Uncanoonucs, Pulpit Rock, and Whipple's Creamery. Appropriate Memorial Day exercises were held. The committee in charge were Mr. Henry Goodwin, Miss E. L. Sampson, and W. R. Davis.

On June 10 a small party of twenty went to East Jaffrey, N. H., where wagons were taken to the Mountain House on MT. MONADNOCK. Fifteen of the party ascended the mountain, and meeting a guide, walked down the path on the northern side to DUBLIN. Colonel T. W. Higginson took charge of the party during their stay in Dublin, and escorted them to Beach Hill, Pine Hill, and Monadnock Lake.

MT. AGAMENTICUS was selected for the June 17 excursion; and forty-five took train for York Harbor, Maine. The Albracca Hotel, eight miles from the mountain, was the rendezvous. The ascent was made by all the party. Other walks were taken to the Nubble and York Beach, and a drive to Bald Head Cliff. The committee were J. R. Carret and C. H. Hardwick.

The Field Meeting was held at St. Hubert's Inn, KEENE VALLEY, Adirondack Mountains, N. Y. On July 1 special cars were provided by the Central Vermont Railroad, the route being *via* Rutland and Whitehall, to Westport, where stages were taken for Elizabethtown; the party, seventy-four in number, spending the night at the latter place, and proceeding by stage to St. Hubert's Inn the next morning. From the hotel the Giant of the Valley was ascended by seventeen members, and Noonmark by thirty-five. Walks were taken to Russell Falls, Roaring Brook Falls, Chapel Pond, Ausable River and Lake, and Gill Brook, and drives to Cascade

Lake and East Hill. A camping-party of forty-two with fourteen guides left the hotel, July 5, for the Upper Ausable Lake, where four camps were occupied. On Wednesday the 6th, fourteen took boats for the Mt. Marcy path, and walked to the summit; a clear day afforded a good view. On Thursday the party returned to the hotel *via* Mt. Colvin. The homeward trip included a day (by steamer) on Lake Champlain and Lake George, and a night (July 11) at the Crosbyside Hotel, the party reaching Boston at 5.30 P. M. on July 12. The committee were W. R. Davis, Chairman, Verplanck Colvin, C. H. Hardwick, and J. R. Carret.

On August 1 a party of twenty-eight left Boston by the Boston and Maine Railroad for Bethel, Me., and thence by stage (22 miles) to GRAFTON NOTCH, where they went into camp (near the post-office) for two weeks. Speckled Mountain and Saddleback were ascended, and a trip was made by steamer from "Lakeside" on Umbagog Lake *via* the Androscoggin and Magalloway Rivers to Aziscohos Mountain. The party was away from camp two days. Drives were also taken to Andover and Dixville Notch. Dr. Thomas Crozier acted as committee.

The Labor Day Excursion left Boston, September 1, *via* Eastern Railroad with twenty-nine in the party, and W. R. Davis as committee. The ascent of PLEASANT MOUNTAIN, Maine, was the chief feature, with drives to Naples and Harrison and boating on the lake.

The autumn excursion, October 14, was to Vermont, *via* Fitchburg and Central Vermont Railroads. Four days were spent at BRANDON (Hotel Brandon), from which point Lake Dunmore, Mt. Moosalamoo, Liana Cascade, Pittsford, Proctor, and Hyde Manor were visited. From Rutland, where the party remained two days, a drive of twelve miles was taken to KILLINGTON PEAK. The party also went to Manchester, Vt., and ascended Mt. EQUINOX. The whole number on the excursion was forty; the committee were W. R. Davis and I. Y. Chubbuck.

The all-day outings were, June 25, a laurel trip to West Gloucester; July 16, a wild-rhododendron trip to Medfield; September 5 (Labor Day), Shaker Glen; September 17, to Gloucester; September 24, to the Sand Dunes on Plum Island, Ipswich; October 21 (Columbus Day), Zion's Hill and Horn Pond Mountain; November 8 (Election Day), Peabody Boulders; November 12, Basins of the Boston Water Works at Saxonville, Framingham, and Ashland. The last-mentioned trip was in charge of Mr. Desmond Fitzgerald, Superintendent of construction.

At two of the regular outings geological addresses were given, — one by Professor W. O. Crosby, who explained the glacial pot-holes at Little Harbor, Cohasset; the other by Mr. Warren Upham, who conducted a study of the third and fourth cliffs (drumlins eroded by the sea) at Scituate.

The Snow-Shoe Excursions were to Waterville and Tamworth, N. H. At Waterville, in February, a party of forty-three was accommodated at Elliott's

Hotel. Nearly the whole party ascended Mt. Tecumseh and Noon Peak, and smaller parties to Black Mountain (Sandwich Dome) and North Tripyramid. From Tamworth, December 28, Mt. Chocorua was ascended by the new path, eleven of the party reaching the summit over snow and ice. Four took the long walk to the top of Mt. Passaconaway, and twenty to Black Snout (in the Ossipee range). Other walks were to Page's Hill, Hackett's Hill, and White Pond.

Only one special Snow-Shoe Outing was taken, on March 7, to Lexington; but snow-shoes were used on some of the Saturday outings. The number of members and friends on outings was 1,697; on excursions, 671; total, 2,368, an increase over last year. The average on outings was $38\frac{1}{2}$; on excursions, 59; snow-shoe excursions, 27; general average, $41\frac{1}{2}$.

ISAAC Y. CHUBBUCK,	} <i>Excursion Committee for 1892.</i>
C. H. HARDWICK,	
JAMES R. CARRET,	
W. R. DAVIS,	
GEO. L. CHANDLER,	

Proceedings of the Club.

February 3, 1892. — One Hundred and Twenty-sixth Meeting.

President Groce in the chair.

Seventy-five persons were present. Six candidates for Corporate membership were elected.

A paper descriptive of "The Waterville Valley," accompanied by a map showing very careful work in the line of hydrography, was presented by Mr. Arthur L. Goodrich. (See APPALACHIA, vol. vi. p. 318.)

A description of a second map of Middlesex Fells, recently prepared by the Club, was given by Mr. Rosewell B. Lawrence. He also showed by means of colors the areas already reserved for public purposes.

Professor Charles E. Fay gave an account of "An Excursion over the Whiteface-Tripyramid Ridge," describing the nature of the various peaks, and mentioning work in the way of exploration which still remains to be done. (See vol. vi. p. 342.)

February 25, 1892 (Evening). — Special Meeting.

President Groce in the chair.

A paper was read by Mr. F. H. Chapin on "An Ascent of Uncompahgre Peak, and a Visit to the Cliff-dwellings of Navajo Cañon." The lecture was illustrated with about one hundred new views.

March 9, 1892. — One Hundred and Twenty-seventh Corporate Meeting.

President Groce in the chair.

Mr. George W. Rollins was elected Secretary *pro tem*. Ten candidates for Corporate membership were elected.

Mr. Isaac Y. Chubbuck read a paper on "Up North Tripyramid on Snow-Shoes" (see p. 14), and Mr. Percival Lowell read a paper on "An Ascent of Fuji."

April 13, 1892. — One Hundred and Twenty-eighth Corporate Meeting.

President Groce in the chair.

About eighty persons were present. Fourteen candidates for Corporate membership were elected.

It was voted "to send to new members elected before July such publications of the same year as may have already been issued gratis."

A paper "Concerning Trees" was then read by Mr. Charles C. Hall, who described various interesting trees in the Boston Public Garden and Common, in Andover, Marshfield, Cambridge, and elsewhere.

Rev. Richard B. Grover followed with a paper on "The Ascent of Mt. Bigelow and Snow Mountain in the Dead River Region, Maine." Excellent pictures of ponds and mountains were thrown upon the screen to illustrate this paper.

Professor C. E. Fay gave a brief account of an ascent of Mt. Passaconaway on Fast Day (April 7), and of Mt. Chocorua the day following. He found that as good time could be made in ascending these mountains at this season of the year as at any other, while the appearance of the White Mountains, spotted and striped with snow, was singularly beautiful. Much snow was found on the Passaconaway path after leaving the logging-roads; hardly any on Chocorua excepting in "the Chimney."

Mr. I. Y. Chubbuck called attention to the usual "Transcript" notices of outings, and requested members to aid the Excursion Committee in leading parties on walks.

May 11, 1892. — One Hundred and Twenty-ninth Corporate Meeting.

President Groce in the chair.

Mr. F. W. Freeborn was chosen Secretary *pro tem*. About fifty persons were present. Sixteen candidates for membership were elected.

Mr. J. R. Edmands spoke informally upon "Some New Paths and Camps on Mt. Adams." These paths and camps are intended to afford a better route to the top of Adams *via* Israel's Ridge, the southern border of the Ravine of the Cascades, and Peabody Spring.

Professor W. M. Davis gave an informal talk on "The Relation of Mt. Monadnock to Mt. Tom," holding that they were remnants of plateaus which formerly covered a large portion of New England. The talk was well illustrated by numerous lantern slides.

June 8, 1892. — One Hundred and Thirtieth Corporate Meeting.

President Groce in the chair.

About sixty persons were present. Twenty candidates for Corporate membership were elected.

Mr. E. H. Russell, Principal of the Worcester Normal School, read an admirable paper on "Camping Out." He was followed by Dr. Thomas Crozier, who spoke about the arrangements for the camp at Grafton Notch.

July 4, 1892. — Twenty-seventh Field Meeting.

Held at St. Hubert's Inn, Beede's, Adirondacks, New York.

President Byron Groce in the chair. Eighty members and friends were present.

The President referred to the previous visit of the Club to this region, and to the very great charm of scenery and the grouping of mountain-peaks, among which the excursions of members were to be made.

Mr. Davis, of the Excursion Committee, announced the excursions for the week, — proposing to ascend Noonmark, Mt. Marcy, Indian Head, Mt. Colvin, and Giant of the Valley; and explained the arrangements for going into camp on the way to and from Mt. Marcy.

Mr. Verplanck Colvin, Corresponding Member of the Club, who, as New York State Superintendent, has had charge of the Topographical Survey of the Adirondack region since 1872, spoke of the study of rocks and mountains as perhaps one of the most fascinating pursuits, associated as it is with delightful experience and adventure. He explained the condition of the Adirondack forests at the present time, and gave a graphic account of the wild fauna of the region. Animals formerly found in this region were the moose, caribou, deer, panther, wolf, bear, beaver, and porcupine. Of these the moose and caribou have disappeared, and there remain very few of the others, excepting bear, deer, hare, and porcupine, which are still numerous.

After eulogizing the study of mountain structure, Mr. Colvin said, in substance: "The study of structural geology, especially amid mountains like the Adirondacks, leads us to a knowledge of terrestrial dynamics at the period when the earth's present surface was being formed and conditioned for the existence of organic life. Since the days of Moses man has sought among God's works for instruction in his duty upon earth; and where can a grander or more wonderful knowledge of the forces of creation be obtained than from the tablets of stone on mountain peaks as solemn and magnificent as Sinai?"

He called attention anew to the total absence of all foreign drift-rock from the central or Mt. Marcy group of the Adirondacks, and to his discovery that all the gneissoid peaks, surrounding the four hundred square miles of the central hypersthene group, were covered with the peculiar quartzite pebbles of the northern, or glacial drift, and that this circle of mountains must have since emerged from an arctic sea, carrying with them, to these elevations around a central drift-free region, great masses of the

foreign rock to the very summits of the peaks which form the rim of what he terms the great drift-free district. He then explained his theory of the local glaciation of the central Adirondack group, and asked his audience to consider mountain forms and mountain structure, especially with regard to the mathematical forms of mountain slopes, as an index to the forces eroding and giving form and shape to mountain masses. Considering great mountain slopes from a general standpoint (disregarding rock-faults, dikes, and irregular formations), Mr. Colvin had found the general law of symmetrical mountain slopes, of the homogeneous crystalline rocks, to be capable of expression in mathematical formulæ, — a discovery of the greatest importance in topographical engineering and dynamical geology. By Mr. Colvin's discovery it is possible, when the height and distance between base and summit of a symmetrical mountain curve of primary rock is known, to compute the positions of the contour lines with accuracy, and plot them, for the purposes of topographical mapping, without even ascending the mountain. Mr. Colvin explained that the formulæ for computation were not complex. In fact, the contours can be drawn in upon a map almost instantaneously by graphical reference to a standard curve in the hands of the topographer. He had discovered in the structure of gneissoid and granitic mountains two primary curve forms, both of which are approximately cycloidal. Of these forms the direct cycloid or brachystochrone of John Bernoulli was the concave form of long mountain slopes, filled and dressed with the detritus of the mountain; in the lapse of ages assuming remarkably close approximation to the "curve of swiftest descent." This is the curve of denudation or erosion modified by the detrital deposits. The second curve is the inverse cycloid, probably the curve of greatest resistance; which, nevertheless, traced from mountain top towards mountain foot, in places appears to resemble a parabolic curve, — so that it might be called a "Ballistic curve," — the rock masses descending over hard projections with frequent percussions; their slow progress being like that of artillery projectiles of infinitely slow motion. These, last, formed the rounded shoulders or buttress portion of the mountains. Mr. Colvin believed that the average direction of the axes of these two curves in mountain-form were an index to the direction of erosion or glaciation, and the *direct* curve (I.) would give us a determination of the line of motion of the forces which had given the mountains their forms.

By Mr. Colvin's discovery the law of the surface sculpturing of mountains of homogeneous rock is made known as follows: —

I. The direct cycloidal curve (Brachystochrone), pointing onward along the line of outflow of the current (ice-mass or water); the easiest curve of adjustment of outflowing and descending particles.

II. The inverse modified cycloidal curve (Ballistic curve), avoiding faultings, representing the buttress forms or shoulders pointing towards the origin of the eroding agency.

These curves determined for any locality, in dimensions, positions, length, and height, it becomes possible to place accurate contours upon maps by computation by distant observation of mountain lines.

There are exceptions; but these can be treated as extreme conditions, while, frequently, segments of extremely small or extremely great curves can be recognized.

The location of the portion of curve found, in any segment, at any one location, and the orientation of the curves, above classified, give us a means of determining the direction of movement of prehistoric glaciers, and we can now accurately interpret the glacial scratches upon rocks by mathematically studying the rock-curves leading to them and from them, the direction of motion of the ancient glacier being along the axis of the line of descent of the hollow; down the concave or "direct" curve.

October 12, 1892. — One Hundred and Thirty-first Corporate Meeting.

President Groce in the chair.

About two hundred persons were present. Professor G. Frederick Wright of Ohio was elected to Corresponding membership, and fourteen candidates were elected to Corporate membership.

Mr. George E. Davenport of Medford presented an interesting paper on "The Middlesex Fells," giving an historical account of the movement to set aside the region as a public reservation, and describing its many natural beauties. The paper was illustrated by one hundred stereopticon views, some of the effects produced being very artistic.

November 9, 1892. — One Hundred and Thirty-second Corporate Meeting.

Mr. Rest F. Curtis in the chair.

One hundred and two persons were present. Twenty-four candidates for Corporate membership were elected.

Mr. John Ritchie, Jr., gave an account of the first State Park in New Hampshire, — "Miller Park," on the southern summit of Pack Monadnock, — dedicated June 22, 1892.

A paper entitled "The Brook Path up Chocorua," by Rev. John Coleman Adams, D.D., of Brooklyn, N. Y., was read by Mr. William H. Ladd. The Path follows Claybank Brook and the southwestern spur of the mountain. The paper was very appreciative of the beauties of natural scenery. (See p. 8.)

The reports of the Councillors of Natural History, Topography, and Exploration were presented. (See pp. 80, 82, 83.)

It was voted to request the President to appoint a Committee to nominate officers for the ensuing year, a Committee on Annual Reception, and the Auditing Committee.

December 6, 1892. — One Hundred and Thirty-third Corporate Meeting.

President Groce in the chair.

One hundred and forty persons were present. Nine candidates for Corporate membership were elected.

The President announced the following committees: Committee on Nominations: George L. Chandler, Miss Susan M. Daniell, I. Y. Chubbuck, Mrs.

J. H. Thorndike, C. A. Wellington. Committee on Annual Reception: Harvey N. Shepard, A. J. Pratt, Miss M. E. Hardwick, Miss C. M. Endicott, J. B. Poole, J. H. Payne, Miss Clara J. Bates. Auditors: C. H. French, F. R. Cordley, and Cheever Newhall.

The President called attention to the special meeting of December 14.

Mr. Quincy Pond presented a paper describing a trip through the White Mountains; the party had wagons and tents, but also did much walking and climbing. Among other places the Madison Spring Hut was visited. A large number of lantern views were shown.

December 14, 1892. — Special Meeting.

President Groce in the chair.

Ninety-five persons were present.

Professor G. Frederick Wright gave an account of "The Discovery and Significance of the Glacial Outlet from Lake Huron to the Ottawa River." Professor Wright's remarks were illustrated with the lantern. Mr. Warren Upham followed, emphasizing the significance of Professor Wright's discoveries.

January 11, 1893. — One Hundred and Thirty-fourth (Annual) Corporate Meeting.

President Groce in the chair.

Seventy-five persons were present. Lieutenant R. E. Peary of Washington, D. C., was elected to Corresponding membership; fifteen candidates to Corporate membership were also elected.

The Club voted to ratify the action of the Council in appropriating to the Permanent Fund all interest accumulated on said fund to time of last payment of interest on the investment. The Trustees stated the amount to be \$115.38.

The Councillor of Improvements presented his report (see p. 84), and the Councillor of Topography supplemented his report rendered in November with the statement that the map of location of summits in New England had been completed, and was ready for distribution. The detailed report of the Excursion Committee was presented by Mr. W. R. Davis. (See p. 88.)

The Annual Reports of the Recording and Corresponding Secretaries, Treasurer, Auditors, and Trustees were presented. It was voted that the reports be accepted and placed on file. (See pp. 67, 69, 75, 77, 78.)

Mr. George L. Chandler, Chairman of the Committee on the nomination of officers for 1893, reported as follows: For President, Charles E. Fay; Vice-President, Harvey N. Shepard; Recording Secretary, Rosewell B. Lawrence; Corresponding Secretary, Frank W. Freeborn; Treasurer, John E. Alden; Councillors, Natural History, William H. Niles; Topography, J. Rayner Edmands; Art, Elizabeth H. Denio; Exploration, Arthur L. Goodrich;

Improvements, Rev. Richard B. Grover; Trustee of the Permanent Fund (for three years), Charles H. French. The report was accepted, and certain oral recommendations were referred to the incoming Council.

The balloting for officers resulted in the unanimous election of those nominated.

In a few pleasant remarks President Groce took leave of the chair, and introduced the President-elect. Professor Fay, in assuming the duties of President, referred to his previous terms of service in that position, to the early traditions of the Club, and to its great and varied work in the past seventeen years.

Mr. Warren Upham addressed the Club on the subject of "Drumlins near Boston" (see p. 39), and the theories advanced were discussed by Messrs. Barton and Niles.

February 8, 1893. — One Hundred and Thirty-fifth Corporate Meeting.

President Fay in the chair.

Eighty persons were present. Fourteen candidates for Corporate membership were elected.

"An Ascent of Mt. Ritter in the High Sierras, written by Mr. Joseph Le Conte, Jr., was read by Mr. Edwin A. Start. The approach to the mountain was from the Yosemite Valley and over Mt. Lyell. The cliffs and snow-slopes of Ritter were well described. (See p. 1.)

"A Summer Vacation in Arizona, with a Trip to the Colorado Cañon," written by Professor C. H. Tyler Townsend of New Mexico, was read by Mr. Charles H. Ames. This interesting paper, with its vivid description of the descent into the cañon, was finely illustrated with maps and charts belonging to the Massachusetts Institute of Technology. (See p. 48.)

The proposition to take parts of the Common in Boston for street and transit purposes was discussed by several members; and it was voted to appoint the President, Recording Secretary, Mr. C. H. Ames, and such others as they might add to their number as a Committee to attend the hearings at the State House on February 9, and utter the protest of this meeting against the attacks upon the Common.

February 16, 1893. — Special Meeting.

President Fay in the chair.

Eighty persons were present.

Hon. Charles Francis Adams, Chairman of the Metropolitan Parks Commission of Massachusetts, addressed the Club on the forthcoming report of the Commissioners, and the proposed system of Public Reservations in the vicinity of Boston. First he treated the subject from an historical point of view, alluding to the settlement of the country, the division of towns, and the annexation to Boston. The natural features of the region were considered with reference to the needs of the people for recreation, especial

emphasis being laid upon the fine beaches and the rocky hills. He explained the act now before the Legislature to create a permanent Metropolitan Parks Commission, and urged upon the members the desirability of creating a public sentiment which shall result in legislative action.

Mr. Sylvester Baxter, Secretary of the Commission, spoke on the same subject, with special reference to the Charles River Basin and the Middlesex Fells.

The Recording Secretary announced that the Joint Committee on Public Reservations would give a hearing on the subject of Metropolitan Parks to the Appalachian Mountain Club at the State House on February 21; also that 559 members of the Club had signed the petition to the Legislature for action in favor of some Metropolitan Parks measure, and that the Club had issued a large number of blank petitions for general circulation.

Officers for 1893.

President.

CHARLES E. FAY.

Vice-President.

HARVEY N. SHEPARD.

Recording Secretary.

ROSEWELL B. LAWRENCE.

Corresponding Secretary.

FRANK W. FREEBORN.

Treasurer.

JOHN E. ALDEN.

Councillors.

Natural History, WILLIAM H. NILES.

Topography, J. RAYNER EDMANDS.

Art, ELIZABETH H. DENIO.

Exploration, ARTHUR L. GOODRICH.

Improvements, RICHARD B. GROVER.

Trustee of the Permanent Fund (for three years).

CHARLES H. FRENCH.

Members added since January, 1892.

CORRESPONDING MEMBERS.

Peary, R. E., Washington, D. C. | Wright, George Frederick, Oberlin, O.

CORPORATE MEMBERS.

Andrews, Miss Katharine H., Roxbury.	Davis, Isaac H., Dorchester.
Angier, Albert E., Boston.	Dennett, Miss Jessie C., West Roxbury.
Bailey, Miss Isabel D., Newton.	Dodge, Solomon P., Dorchester.
Baily, Henry, Newton Centre.	Dresser, Horatio W., Boston.
Baily, Mrs. Henry, Newton Centre.	Dresser, Julius A., Boston.
Baldwin, Judson, Boston.	Eaton, Miss Frances, Boston.
Barry, Miss Esther E., Newtonville.	Endicott, Miss Helen E., Canton.
Bartlett, Stephen S., Boston.	England, W. A., Winthrop.
Beals, George W., Boston.	Fall, Charles G., Boston.
Bean, Henry S., Roxbury.	Farwell, Charles G., Boston.
Bean, Walter Raymond, Roxbury.	Faxon, F. S., Brockton.
Berle, Adolph A., Brighton.	Field, Parker B., Boston.
Berle, Mrs. Adolph A., Brighton.	Fitz, George Wells, Cambridge.
Bowdlear, Miss H. Elizabeth, Roxbury.	Foxcroft, Frank, Cambridge.
Brooks, George W., Mattapan.	Frizzell, Joseph A., South Boston.
Brooks, Lyman B., Boston.	Fuller, Charles S., Lynn.
Brown, Miss Augusta M., Boston.	Garland, Miss Caroline H., Dover, N. H.
Brown, David H., Boston.	Gerould, C. Walter, East Boston.
Bullard, Charles G., Boston.	Glidden, Miss Mary E., Neponset.
Burbank, Miss Mary L., Waverly.	Goodwin, Miss Frances, Jamaica Plain.
Burt, Frank H., Newton.	Goodwin, Miss Mary Evert, Jamaica Plain.
Capron, Miss Carolyn S., Newton Centre.	Gowing, Harry G., Boston.
Capron, Miss Fanny I., Newton Centre.	Harrington, Ephraim, Dorchester.
Carlson, Harry J., Newton Centre.	Harwood, Frederic E., Boston.
Carpenter, Miss Ida May, Yokohama, Japan.	Hawes, Miss Addie Belle, Wellesley.
Carret, Miss Anna W., Cambridge.	Herman, J. E., Boston.
Carter, Miss Nina, Roxbury.	Hill, Miss Charlotte F., Lynn.
Clapp, Mrs. Florence S., Roxbury.	Hodgman, Miss Hattie M., Waverly.
Cobb, John Storer, Boston.	Homer, Fred, Boston.
Coffin, Miss Josephine P., Boston.	Howland, Arthur B., Boston.
Cole, William M., Cambridge.	Hunt, Charles L., Clinton.
Cordley, Mrs. Jenny Dean, Roxbury.	Isenbeck, Charles A., Boston.
Davis, Miss Alice E., Newton.	James, Charles L., Brookline.
	James, Mrs. Charles L., Brookline.

Johnson, John A., Jamaica Plain.	Rhoades, Miss Helen F., Neponset.
Jones, Miss Adeline P., Boston.	Rice, Mrs. David Hall, Brookline.
Jones, Alfred, Boston.	Richardson, Spencer W., Boston.
Jones, Miss Laura A., Roxbury.	Roome, Miss M. Edna, Jamaica Plain.
Kidder, Nathaniel T., Milton.	Sargent, Miss Mary E., Medford.
Kimball, Frank R., Boston.	Seward, William A., Boston.
Kimball, John E., Oxford.	Smith, Miss Annie R., Newton Centre.
Larrabee, Ralph C., Cambridge.	Smith, Ernest C., Framingham.
Lincoln, Miss Annie R., West Rox- bury.	Spilman, Benjamin F., Roxbury.
Lindsay, T. B., Boston.	Spilman, Mrs. Benjamin F., Roxbury.
Lord, Samuel C., Peabody.	Start, Edwin A., Tufts College.
Lovett, Robert M., Cambridge.	Swain, Miss Anna G., West Newton.
McGrath, James, Quincy.	Tappan, Roger, Boston.
Markham, Edwin F., Newton.	Teele, Miss Carrie A., Medford.
Merriam, Mrs. E. F., Sharon.	Thayer, Miss Elaina, Brookline.
Merrill, Mrs. B. F., Boston.	Thorndike, James S., Brockton.
Merrill, F. J. H., Albany, N. Y.	Tomlinson, Henry A., Newton Centre.
Merrill, Miss M. W., Boston.	Torrey, Elliot B., Lynn.
Metcalf, Miss Clara I., Boston.	Tracy, James J., Boston.
Morison, George B., Boston.	Tufts, Miss M. A., Somerville.
Packer, Marcus M., Roxbury.	Vinal, Miss Martha A., Somerville.
Palmer, Joseph N., Boston.	Warren, Harry E., Newton Centre.
Parsons, Miss Sally, Lynn.	Waterman, Miss Mary, Dorchester.
Peirce, Charles F., Lynn.	Weld, Miss Edith, Jamaica Plain.
Perrine, Frederic A. C., Boston.	White, Mrs. Achsah P., West Newton.
Pierce, Miss Annie M., Somerset.	Wing, Miss Emeline, Jamaica Plain.
Presbrey, Palmer E., Boston.	Witherell, William O., Roxbury.
Putnam, Harrington, Brooklyn, N. Y.	Young, Henry C., Boston.
Raynolds, Joshua S., Boston.	Young, Mrs. Henry C., Boston.
Raynolds, Mrs. Joshua S., Boston.	

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THE WEISHORN AND SCHALLHORN.
FROM THE SNOW ARÊTE OF THE ROTHHORN.
From a Photograph by Vittoria Sella.

APPALACHIA.

VOL. VII.

BOSTON, DECEMBER, 1893.

No. 2.

Back Ranges of the Selkirks.

By H. P. NICHOLS.

Read October 11, 1893.

THE REV. WM. SPOTSWOOD GREEN (A. C.), whom we have reason to thank for discovering the Alps of New Zealand, is also our guide into the existence and into the possibilities of our greatest North American snow range, the Selkirks. This mountain range lies between the Rockies and the Gold range, practically parallel with them, and separated from each, strangely enough, by the same river, the Columbia. Between the Rockies and the Selkirks the Columbia is flowing north. Between the Selkirks and the Gold range, as we again cross it, the same river is flowing south, having made a great bend through the Selkirk mountains, to be later joined by the Kootenai, whose origin was but a mile and a half from its own. This interesting bit of geography must be studied on the map to appreciate its peculiarity.

While the Canadian Pacific Railroad has made possible the approach to the Selkirks and the passage through them, Mr. Green has led us to look beyond the observation car and the Glacier Station platform. His book, "Among the Selkirk Glaciers," describing explorations of some six weeks in these mountains, made in the summer of 1889, is a classic for mountain lovers and Alpine climbers.

We Americans have, hard at hand, without sea-sickness, without great expense, a range of mountains, rivalling the Alps, furnishing all the cherished features of mountaineer-

ing, with peaks not only unexhausted, but even unnamed and unseen.

Our obligation to the Canadian Pacific Railroad is great, not only for carrying us in a few quick days into the heart of a region unknown before, but because of the disposition shown by the officials to encourage the mountain lover and explorer. Splendid photographs of easily accessible scenery at once advertise the road and invite the traveller. From Glacier House well-made paths already give easy access — as easy as heights to be surmounted, streams to be waded, boulders to be jumped, permit — to glaciers, snow-fields, ridges, and peaks. Mr. Perley, the host of the Glacier House, is ready with courteous information and assistance, eager to encourage mountaineering, to accompany the climber, and to add to the number of possible expeditions from Glacier House as a centre.

Such expeditions are practically numberless. From Glacier House itself we see an almost unbroken circle of snow peaks with embosomed glaciers, not half of which have ever been climbed. Green's failure on the master peak, Sir Donald, inciting the Swiss to its conquest, has been put side by side with Whymper's familiar story of the ascent of the Matterhorn; and there is a point on the lower summit of Cascade Mountain from which the view of Sir Donald exactly reproduces one of the more striking faces of the Matterhorn. The Hermit range at the head of the railroad pass contains at least one mountain higher than Sir Donald, called by its intrepid climber "Swiss Peak." Only this year, Cheops, a solitary point facing the station platform, has been conquered in one long day.

But behind the visible ranges, especially to the north and west, rise to the utmost horizon splendid peaks, some sharp and rocky, some white and glistening, some serrated along tremendous ridges, holding immense snowbanks in their embrace, trailing far down into unvisited valleys their winding glaciers, planted in their splendid forests of fir such as only these Pacific ranges produce. No railroad leads into these tangled depths; no observation car catches glimpses of these remote peaks. They beckon the climber, with charms

that older Alps have long since lost, to the arduous toil and inexpressible gladness of their conquest.

For three years a sentence in Green has been my inspiration for action when the right time came. In one of his remote excursions of five days' camping, after having again and again told of the glory of three companion peaks, named by him Fox, Dawson, and Donkin for English climbers, he writes: "We then ascended the moraine of the Dawson glacier and examined the peaks surrounding it. Mt. Donkin might be easily scaled from the side, so might Mt. Fox; but the peaks at the head of the glacier presented most precipitous faces." So far as I knew the suggestion had not been taken advantage of. One of the peaks remained for *me*, if strength and companions were at hand. Further incentive was found in an excellent photograph of the three peaks, which may be called, from their central and inaccessible sovereign, the Dawson range.

Arriving at the Glacier House on Tuesday, my preliminary exercise was taken on the Illicellewaet glacier, the pride of the hotel; in a rock climb to Perley Rock, a great boulder at the glacier's head, from which Green attempted Sir Donald; and especially in a day on Mt. Abbot back of the hotel, from which my first view was had of the Dawson range. The inspiration, before but half awake, became a frenzy. It seemed impossible I was looking at anything earthly, at least American. The three peaks, each with his distinctive characteristic, — Donkin, a sharp point; Dawson, a majestic mass; Fox, a grandly truncated cone, — soared in brotherly grandeur between snow and ice and rocks and green and rushing torrent. It was likest the Bernina-Palü-Morteratsch range as seen from Piz Languard in the Engadine, and that is likest the purity of heaven's imagined battlements and whiteness.

The management of the Glacier House may well advertise Mt. Abbot as one of their chief attractions. Like the Flégère at Chamouni, the Gorner Grat at Zermatt, and Piz Languard at Pontresina, it is so situated as to command a whole circumference of noble peaks. Though 7,600 feet high, it is but six hours' walk there and back, and one passes on the way the beautiful Marion Lake nestled on the steep moun-

tain-side. A little cutting on a steep grass slope and on the face of the final ridge would make the route an easy one as well.

The route was up the Asulkan stream, a side glacial torrent running into the Illicellewaet. A trail with the usual characteristics of mountain trails on lower levels leads as far as the snows.

Some features unfamiliar to White Mountain residents mark the Selkirk pathways. Vegetation is very luxuriant, owing to the heavy rainfall. This explains too the abundance and low reach of the glaciers. It also explains the contrasted barrenness of the Rocky Mountains, the moisture from the Pacific having been already precipitated. The trees rise to a great height, and the tangle of underbrush is terrible if one has no path. The streams are turbid, rapid, and at midday so full as to make crossing an impossibility. Down into the valley from heights on both sides drop splendid waterfalls. The sound of rushing waters is ever in one's ears.

So is another sound, the strange cry of the whistling marmot,—marmot calling to marmot across the shilt of some boulder-sheltered hole.

Amid such rankness and rush of Nature we kept in each other's footsteps till the melting snows of the mountains were reached. The smell of the rich vegetation is in our nostrils. The tall ferns are involuntarily crushed in our hands, as the way is forced through them, and the health and strength of the forest seems to enter through the pores of the palms. The ears drink in the sound, half roar, half splash, of the glacial streams. The eye turns from floor to ceiling, from wall to wall, of this opening hall-way and staircase of Nature's palace.

A mountain park or paradise is reached, seeming, from Mt. Abbot, to be almost level, but proving a steep fir-studded slope. Here grow all manner of beautiful flowers, a bouquet of Oriental brilliancy, renewed at each day's recession of the snow-bank. The tufted anemone, the "gosling" of Minnesota, was found in full seed, as it had blossomed in April, not far from a little bud sprung up yesterday from roots uncovered from the snow. The Selkirk lily, a variety

of erythronium or dog-tooth violet, was here in profusion in August, passed away at Glacier House in May. A beautiful pink and white caltha, sister to our marsh marigold, crowded a moss-wet surface, last week a snow-field. There were Alpine pinks and larkspur, and a beautiful pendulous rhododendron scenting the air with a spicy smell.

Where the slope was more level wild grass abounded. We involuntarily listened for the tinkle of Alpine herds. It cannot be long ere the thrift of American peasantry and the necessities of population will force the chalets and summer flocks up to these unused resources of Nature. My own Yankee sense saw more than one spot for building a prosperous summer hotel at apparently no greater disadvantage than the hotels at Mürren or on the Riffel. The one difficulty is the inaccessibleness of the lower valleys themselves.

In a little over three hours we struck the snow-slopes of the upper Asulkan glacier. Here we roped, and under the guidance of our skilful and cautious leader, wound among the crevasses and reached the summit of the pass, 7,500 feet, in another hour. Here the Dawson range burst on us in its near beauty. From this point Notman's famous photograph was taken.

The other side is snowless,—an awful drop of 2,500 feet to the Geikie glacier, which seems to lie as low and run as far as if it were at the very shore of the ocean. This slope is slippery grass, ploughed perfectly clean of even a nubble by the spring avalanches. Nothing will stand on the mountain side, not even a man unless propped by an ice-axe. When Green camped here, he writes, "It took an hour's work with ice-axes to clear a level place to lie on." Fortunately for us we found an old miner's cabin under a ledge,—prospectors will toil and climb for love of gold where lovers of Nature hesitate. We made a fire and cooked our meal. There were no vessels to cook in, and two young partridges killed *en route*, set to stew in a bean can, fell ignominiously into the ashes.

But the Dawson range lived on, and we sat and studied Mt. Fox, the mountain we had decided upon, questioning his reception of us. Mt. Fox is the most eastern peak, the left

hand one as we looked at the range. He rises like a great outwork from the central range of the Dawson itself. On that side he is impregnable, but his foot planted in the Geikie glacier seemed to have vital connection with leg and thigh and snow-white breast and proud, broad forehead. At least we resolved to see whether these organs were united.¹

Saturday, August 19, began at 3.30 A. M. for us. It was a cloudless day. Breakfast was a matter of two hours, the more the pity, but water was a quarter of a mile away along a slope of forty-five degrees of slippery grass. I never begrudged eating and drinking so much before, but there was a long day's work before us.

Light-laden, we made the fearful drop — 1,500 feet in half a mile — to the Geikie glacier in less than an hour. It looked but ten minutes away from us. Whether we used feet or hands or seat or Alpine stock as propelling members, it were hard to tell. We were an hour and a half crossing the Geikie glacier, though, on our return — under the impulse, shall I say, of experience or a thunder shower or fear of a shelterless, superlunary night? — we made it in twenty minutes.

Then followed the familiar forest ridge, moraine, bog-patch, snow slope, Alpine flower-garden, — happy, healthy, upmoving. This was the mountain's foot and leg. Of course we stopped to lunch. The water from every side-stream was pure nectar; it seemed both food and drink. It was 8.15, three and one-half hours from camp, ere we attained the same elevation, 6,500 feet, as that from which we started. Thus far the way had been comparatively easy and the natural one to follow.

Now began work. We were on the thigh. We had turned sharp to the left. First, it was grassy slopes, conquered by zigzagging. Then it was 1,500 feet of loose rubble and boulder, hazardous for the climber, more hazardous for the man behind. Once a rock shot down past us, twenty tons in weight, attaining a velocity so tremendous as to bound a hundred feet at a

¹ The photograph is of Mt. Fox, with the connecting ridge of Dawson. The ledges at the lower right hand of the picture were those up which the ascent was made, keeping well to the right, and over the extensive snow-field seen near the top. The final cone, so foreshortened in the photograph, was attacked from behind what here appears.



MOUNT FOX.

From a Photograph by William Notman & Son, Montreal.

jump. As we neared the upper crags, avalanches of stone and snow came thundering from the opposite cliffs of Dawson, perhaps one every five minutes,—no danger for us, but a sort of warning note in the air and a wonder to look at. The shelves of the crags were threateningly narrow, and we were forced to make a *détour* on the rubble again.

It was noon ere we reached the snowy breast. That crossed, the great dome itself loomed up before us. It was like the dome of Adams, but looked higher. It was higher. The aneroid showed our present height to be nine thousand feet. Our wildest guess made the dome only five hundred feet more. When we stood on the top the aneroid measured 10,200 feet. That dome alone was 1,200 feet high, and it cost us an hour and a quarter, with twenty necessary rests. At 1.25 p. m. Mt. Fox was conquered.

The sorrowful feature of these great climbs in regions remote from supplies is the impossibility of remaining long at the summit. We built our cairn on the highest point, and ate our prunes and chocolate. There was a rocky crest some hundred rods away, across a dangerous snow cornice and serrated ridge. It looked lower than our position and very difficult of access. If climbed at all it must be from the other side. Since our climb we have learned that the peak has been reached from the other side by the Illicellewaet nevé. The knowledge, though it crossed our pride, did not detract from the originality of our purpose.

Fifteen minutes for the view. Words fail to picture it; neither can a photograph. Imagination of a man enkindled by the vision gives to it its real beauty, its suggestive meaning. The near neighbors were the most imposing,—Dawson's great shoulders cut off from us by a deep ravine; Donkin's sharp point, much lower than our standing place; behind these, to the south, one noble mountain, purest white from base to broad summit, which must be the one the Swiss named "Mt. Purity." A little to the west lay the greatest glacier in our vision, filling many degrees of surface, and backed by peaks higher than our own. Among these was Mt. Bonney, which Green had climbed. To the west and north were countless sharp, rocky crests, broad snow summits, awaiting

a name and a master. Fish Creek valley darkened in the foreground, receiving into itself a hundred glaciers. One of these comes from the Illicellewaet névé, seventy-five square miles of snow dominated by Sir Donald. Then one hundred miles to the east lay the Rockies, their green foot-hills, their sharp rock crests, and their supreme snow-banks.

We were forced from the summit at quarter before two. There were rolling boulders, and slippery grass, and yawning crevasses, and no supper or shelter till all were passed, down 5,200 feet, and up 1,500 feet. Ah! that last was the rub! It was past six when we were on the Geikie glacier. The air was dark with thunder-clouds. The formidable slope was before us, and we were tired with fifteen hours and a half of climbing, six hours roped. But fire and food are a great incentive. Somehow — it seemed impossible — we pulled ourselves up that slope; somehow, as darkness drew on, we were saved from falling over precipices; somehow the foot of our leader brought him to the hut long invisible. And I saved a rare botanical specimen, and forgot the fatigue in half an hour of warmth and food.

We came to the Glacier House in fine time the next morning after a Sabbath day's journey of six hours; and I preached on "The Glory of Aspiration" in the evening. My remaining time in the Selkirks was spent in teaching my boy what little I know of climbing, that he may conquer some of the ridges yet farther back that we saw from afar.

An Ascent of the Weisshorn.

BY PHILIP STANLEY ABBOT.

Read March 8, 1893.

APART from its mere altitude (14,800 feet), in which respect it stands fifth in Europe, the Weisshorn has a place of its own among the greater Alpine summits. Its savageness does not strike you dumb, like the Matterhorn; and in the grandeur of mere size, Mont Blanc, rising as it does from a circle of peaks

not of the first rank, has of course no rival. But the Weiss-horn is far more beautiful than either. Indeed, I cannot help thinking that from certain points of view it is more beautiful than anything else in Switzerland. It is the perfect mountain; the kind a child who had never seen one would picture to itself,—a great pyramid of snowy white, sweeping up in unbroken curves to a point so exquisitely sharp that it seems a desecration to think of treading there. This is the aspect of the mountain which confronts one as one drives down the valley of the upper Rhone. Those who find themselves there in the heat and dust of August are not likely to forget the fairy-like purity of its outline and color, soaring up above the haze of the early morning into the cool blue of the sky.

But the Weisshorn has other claims besides beauty. It once possessed a reputation. Of the great peaks, those which tempted everybody from the start, it was among the last to succumb. Its first conqueror—in 1861—was no less a mountaineer than Professor Tyndall. Like several of his friends, he had already tried and failed; and he seems to have had a tough time of it when he succeeded. Having slept out at a height of 4,000 feet above the valley, he worked ten hours—once almost giving the job up—before he reached the top. Nine hours and a half were needed in the descent. No one followed him for two years; then came Leslie Stephen, whose long legs stalk victoriously through many years of early Alpine history. He shortened the total time to seventeen hours. Since then the Weisshorn has of course yielded to the inevitable fate of all Swiss peaks. The original ascent had constituted Tyndall's chief claim to glory, and it was still an achievement for his first successors. But the guides learned more about the mountain; the details of the route, bit by bit, were improved; the worst *mauvais pas* were circumvented. That portion of the climbing fraternity who regard their sport as essentially a new form of steeple-chase brought down Tyndall's record to nine hours and a half. Then they altogether renounced the orthodox route as too tame, and went in search of reputation by inventing new and wrong routes. There are now three of these, together with four "variations," on almost any one of which you

stand a reasonable chance of breaking your neck. However, the Weisshorn has not suffered quite so badly as most of its rivals. There is still only one line of ascent which forms a recognized part of every guide's repertory, and this has not become a popular excursion like the Matterhorn or Rothhorn. It is defiled by a set rope in only one place. It has even killed at least one victim,—although this was under extreme provocation. In certain states of the snow, often for a week at a time, it is totally inaccessible. If you get to the top, therefore, while you have not the ghost of an excuse for being puffed up with conceit, you have at least the satisfaction of doing a perfectly reputable thing,—not like the Matterhorn; for if you speak of the latter in any but a half apologetic tone, people nowadays will set you down as probably second rate yourself.¹

I had set my heart on the Weisshorn from the very first; but it was not until the fourth week of my month of climbing last summer that my guide and I felt ready for it. At last, however, on Wednesday, the 24th of August, we crossed the Ried Pass, from Saas Fee in the next valley eastward to St. Niklaus in the Vispthal; and it was settled that the next morning we were to take the train for Randa, the village next above, get blankets and food there, and in the afternoon stroll—as certain of our trans-Atlantic brethren are wont to say—up to the sleeping-place. The phrase serves the double purpose of sounding modest at the first blush, and of incidentally conveying your contempt for those who are less tough than yourself. In point of fact, the stroll in this case is a singularly steep and perspiring grind of nearly 5,000 feet.

We were balked that time. All day long on the 25th the clouds hung over the valley like a thick gray lid, drenching us and covering the heights with a hopeless mantle of fresh snow. After such a storm the Weisshorn, like all mountains involving work on a sharp arête of rock or ice, is out of the question. Before you dare trust the new layer of snow it

¹ I mean amateurs. Your guide will probably treat the Matterhorn with more respect than almost any other of the Zermatt peaks. On no other is the weather so treacherous, and on no other do unfavorable conditions add so enormously to the difficulty.

must have lain under a blazing sun, and then refrozen several times, until it has become solid and firmly adherent to the surface on which it rests. Otherwise, on the tremendous slopes of the final ridge, you would have more than a chance of riding down several thousand feet on the crest of an avalanche. There was nothing for it, therefore, but to return to the Riffelalys, get dry, and reflect. The Weisshorn is notoriously slow in getting into condition, and I had just one week more.

That night, however, the stars came out. For three days the sun beat down royally; as we watched the great cliffs of the Rothhorn on the other side of the valley, the ill-omened powdering of snow visibly disappeared. Finally Peter admitted that the chance was worth trying. Accordingly by Monday noon we were rattling away from the doorway of the Monta Rosa Hotel down in Zermatt, suffering tortures in a native vehicle, but happy nevertheless; we were bound for Randa. There we picked up what we wanted in the way of blankets and pots and pans, and inward refreshments as well, and hired a supplementary boy to carry them.

The boy brought our party up to four, the others being myself and the two guides, who had been with me for the entire month. The man is fortunate, or the woman either, who secures the services of Peter Sarbach, my leading guide. He was a big, bearded man, who had been on the mountains all his life, as steady as a rock, and as honest as daylight, with eyes that twinkled at anything funny just like a boy's. Unlike so many in his calling nowadays, he was not half a peasant and half sophisticated, but was delightfully unspoiled,—none the less, however, the jolliest and most thoughtful of companions. Best of all, you could rely on his judgment; he was safe. It is a great thing to have for your guide a married man with seven or eight children. His comrade, Lager, was an automaton, and could be accurately summed up as a pair of legs, good in themselves and admirably trained to follow Peter. It may seem extravagant to take so large a force of guides, but this cannot be helped. Once on the ice, you must go roped; and the rope gives no sure protection unless there are at least three on it. You are

supposed to do your own climbing, of course. The second guide is added for precaution rather than for aid.

We left the inn at Randa about three o'clock, struck across the level floor of the valley for three minutes, and then, without further preliminaries, the grind began. If one fancied it indefinitely prolonged, one could make a very tolerable nightmare out of the first stage of a climb, at least in the Vispthal. The wall of the valley, up which you creep in order to reach the higher level where you stop for the night, and from which the peak rises, is perhaps steeper than the peak itself. For the first three thousand feet it is thinly covered with a dismal growth of parched and dingy pines. In the spring it is probably different, but in August there is no herbage to speak of, no flowers, and no bushes,—nothing but an everlasting zigzag of dusty path. In one way, however, the very meagreness of the forest carried its own compensation. Little by little, the whole of the magnificent range opposite which bounds the valley on the east revealed itself,—the Nadelgrat first; next, and directly opposite us, the twin Mischabelhörner, one of them overtopping the Weisshorn, and both of them rivalling it in sharpness; then the Alphubel, the Allalinhorn, the Rympfischhorn, the Strahlhorn, and finally Monte Rosa itself. No point in the range is lower than 12,000 feet, and of the peaks only one is less than 13,500. The afternoon sun lay so full and clear on that side of the valley, that on the upper slopes of the Täschhorn, leading down from the summit, we could even see a line of footsteps cut within a few hours.

Finally our own slope eased off; we caught the sun again; the trees became stunted and then disappeared; we had grass and flowers under foot. This was the "alp" in the proper and limited sense of the word. The path now degenerated into a mere goat-track, and led straight toward the west,—toward snow-fields also, judging from the chill in the breeze that met us. Then came a slight corner in the path; we turned it, and there at last, in front of us, was the Weisshorn. It was just before sundown, and we had reached our sleeping-place, 4,700 feet above Randa and 9,300 feet above the sea.

While the guides were making ready for the night, I had

nothing to do but sit down and use my eyes. Alpine sunsets are probably familiar to most members of the Club; and if not, language gives such a poor ghost of an idea of any beauty which consists chiefly in light and color, that it would be scarcely worth while to try to describe it. I cannot help feeling, however, that one must watch the sight from a bivouac in the open air, high up and hemmed in on every side by a horizon of rock and ice, before one can comprehend it. The impressive thing is the hush, and the overpowering and sudden sense of loneliness. The silence is that of a world that is not sleeping, but dead.

But there were other things to attend to besides revery. The evening before gives generally the only chance one has to examine the work before one as a whole. What I saw was this: The Weisshorn would be a singularly perfect cone if its three sides, instead of being hollowed out, were planes. As it is, one can describe it as composed of three great knife-like ridges, meeting with perfect accuracy in a single point of snow. One of these ridges, invisible from where I stood, stretches from the summit a little to the west of north; another, behind which the sun had just dipped, a little to the west of south. Both are steep, and so wasted by the weather as practically to be inaccessible. The third, which runs eastward toward the valley, was our point of attack. Our sleeping-place was less than a mile to the southeast of its foot. For a few hundred yards at the beginning, we could see that our way the next morning would lie over a gentle slope of loose shingle. Then it turned due west, to cross a small and level glacier at right angles. Beyond this glacier, and like it flowing southward but raised above it on a sort of shelf, lay another, to reach which from the first you had to mount a wall of rocks. Over this second glacier was evidently our way, straight up to a gully at the foot of the arête itself.

The eastern arête differs from the other two. Instead of descending in a single line to the level of the snow and ice which surround the peak, it breaks off abruptly a thousand feet above, spreading into a narrow face as a Gothic flying-buttress does. The slope here is of course steeper than that of the ridge from which the face descends; on the other

hand, this face allows you a certain choice of route, as the ridge does not. Once you have reached the latter, you must force your way along its crest, or else fail. Its first part rises gently enough, but that is not the question; the real difficulty, I could see, lay in the way the frost had carved and hacked it,—in the clefts and in the jagged and fantastic teeth of rock which stood out so vividly against the clear green of the sky. But above the largest of these pinnacles the outline all at once changes. At a height of about 13,000 feet the snow, which lies unbroken on the northeastern side of the mountain, spreads up over the crest of the arête itself. From there on the profile of the latter is exquisitely simple,—a line of pure white, first rising gently, then more rapidly, then sweeping dizzily up to the tiny summit, which seemed as ethereal, from where I stood, as it had looked forty miles away. The real doubt of the expedition lay in these last 1,800 feet; for no one could tell before trying it whether the snow would do. One's spirits are apt to be a little demoralized by the chill which stabs one the moment the sun goes down; the longer I fixed my eyes on the summit, towering up through the transparent air to where the sky was already beginning to grow dark, the more unreal it looked. I was glad to come back to where the guides were brewing a pot of soup.

I suppose a true woodsman would consider our bivouac rather luxurious than otherwise; for we had a little straw to soften the angles of the bare rock, and were protected from the wind by what was left of the walls of a miserable shanty, which in better days had been a hut of the Swiss Alpine Club. Still, something is to be said for the temperature of a night passed within a few hundred feet of perpetual snow, when you have only two thin blankets, and no fire at all. Needless to say, the process of undressing consists of putting on the entire contents of one's knapsack,—and in case of need, the knapsack itself. As it happened, we were favored by a comparatively warm night; but this good luck was more than made up—I hope it is not ungallant to say so—by the arrival of a second party, consisting of three guides, and two Englishwomen without an escort. Not that such a thing

embarrasses one in the high Alps; you get accustomed to living in a sort of feminine Utopia, where the ladies climb in knickerbockers, and ask you, before you have been introduced, to lend them your guides, and of course think nothing of going unattended. But in this case there was only one level spot within our pen. Their coming, therefore, consigned me to a ledge of rock in the nature of an inclined plane.

Yet even in this there were two advantages. I had a longer opportunity to enjoy the starlight. Monte Rosa, distant ten miles as the crow flies, was unquestionably visible, not in its outline, but as a huge whitish mass, looming up formlessly out of the darkness of the valley. Can the dwellers at the sea-level equal this? And, secondly, Peter's voice was a little less hateful than usual when he called me before one o'clock. Universal as they are, one never gets accustomed to these early starts. One's whole soul rises up in protest; for the moment you honestly don't care a fig whether you reach the top or not; and besides, you are sure you can't. There is no other way, however. After the sun has had time to soften it, the snow is less safe over crevices, and is frightfully fatiguing to ascend; the later you are on rock slopes, the more exposed you are to the risk of falling stones and ice; and you need to leave a margin of time in case of bad weather or accident.

There comes an end to the longest of hours. At last we had crowded down a little food, had stripped off our padding, had got together snow spectacles, mittens, lanoline to smear the face and prevent sunburn, leggings, and rope; the guides had packed up lunch and lighted the so-called lantern (a candle stuck in a folding mica case), and at two o'clock we took our axes, stepped out into the darkness, and were off. We were ahead of the other party, anyhow.

You have a curious sense of elation when your feet have once begun to move, almost as absurd as your gloom the moment before. If left to your own devices, you would probably rush the pace and kill yourself; you would have mountain sickness within three hours, and of course that means defeat. But the guides are more philosophical. Peter fell into the old swing, never for an instant stopping, yet probably not covering so much as a mile an hour. For a while the work was unusu-

ally simple. There was no moraine to vex us. We very soon got off the slope of loose shingle directly upon the first glacier; and this was almost uncrevassed. There is no pleasanter sound in life than the steady crunch of your boot-nails on the crisp snow before dawn. Just as we reached the farther side, we looked back, and were pleased to see that the light of the other party had barely started. The wall of rocks, by which we were to get up to the level of the second glacier, of which I spoke as leading to the foot of the arête, proved easy even by lantern-light. So, we took for granted, would the glacier itself be.

But here we reckoned without our host. The slope was now much steeper, for instead of keeping on toward the west, across the line of flow of the glacier, we turned northward and straight up. Singularly enough, the snow, which lay thick on the slightly lower level of the first glacier, had almost vanished here, leaving bare the rotten ice. The slope was too great for our hobnails to catch; the surface was too hard to kick steps; and though by cutting single quick gashes with the ice-axe, we could have advanced quickly enough, Peter, who led, and necessarily carried the lantern, had only one hand free. There was nothing for it but to go back to the wall of rocks, and ascend by that. So we stopped and put on the rope, I in the middle and Lager bringing up the rear. From the muffled growl which Peter set up, it was plain that he was considerably out of temper.

It often happens that the nastiest part of the day's work comes at the beginning, where no one expects it; and this was an illustration. There probably was very little danger, as we discovered later,—one would have slid to the end of his tether, barked his shins, torn his clothes, and then been pulled up. Still, one would rather not put this comforting faith to the test in the dark. The rocks were smooth sloping slabs, with no decent footholds to speak of, with handholds scarce enough, and these only the man who carried the lantern could see respectably. I have a vivid recollection of one especial place where I found myself hung up. I did n't dare to go on till Peter was firm and could check me if necessary with the rope. It was out of the question to go back at all.

The hold on which I depended could n't, with any respect to words, be called a hand-hold, — it was a fingernail-hold. There were several seconds, in consequence, during which I refrained from disturbing the equilibrium by a full breath. Peter was a good man, but in his running accompaniment of patois the word *teufel* certainly predominated.

It seemed as if we spent hours on that abominable ridge, and certainly the gray of the morning had half melted away into the dawn, before the rocks finally ended in a short arête of ice, leading across the head of the glacier to the foot of the buttress. The lantern was out now, so that Peter could cut a few hasty steps. In five minutes he had reached the point where under ordinary circumstances the real work of the day begins. From this time on, at least, we had light. People sometimes wonder why the charm of an Alpine sunrise is so elusive. This is partly because it depends upon atmospheric effects, and upon the quality rather than the intensity or variety of the color, — upon effects which do not repeat themselves at lower levels, and for which there are no terms in our language. How could any one put into words the contrast between the rose color in the sky and the snow? But there is another reason: sunrise is no longer a mere spectacle. When you have been slipping and groping for hours in the darkness, and longing for the light, you appreciate for the first time what its coming means.

The buttress was rather easier than it looked. While the average slope was steep enough, — from recollection I should say about 60° — yet it kept to the average pretty evenly. I don't want to be understood, however, as praising this part of the mountain too highly. The rock was somewhat crumbly, the ledges were dirty, there were singularly few interesting bits of climbing, and the slope did n't know when to stop. On the other hand, we had considerable choice of route and no real *mauvais pas*. To mollify Peter, we made fair time, — a little too fair, considering that our work already had been severe. For the next six hours I felt the usual effects of such an indiscretion, — languor, and a strong distaste for food while in the higher altitudes. We ought to have rested and eaten earlier. It was not till after five, just

in time to see the actual rising of the sun, that we stopped for our first breakfast, half way up the buttress.

We were disappointed several times ; but at last the face grew unmistakably narrower, rose less rapidly, and became knifelike ; and all at once the summit of the mountain appeared, together with the whole of the northeastern and southeastern faces leading up to it,— the former a single dazzling sheet of snow broken only by crevasses, the latter an alternation of ribs of gray rock and narrow gullies up which stretched tongues of ice. We were done with the preliminaries at last, and were on the arête.

Now came the glorious part of the day. It was the perfection of climbing,— the maximum of excitement with the minimum of real danger. I don't suppose the arête was ever so much as six feet broad, and at times it was less than one foot,— knife-edged, in short. The slope of snow on our right — the north — was pitched about as steeply as snow ever lies, certainly at an angle of 50° . Once started, unless the jaws of a crevasse intercepted you, there would have been no trouble in shooting down 3,000 feet without slackening your pace. On the other side, the angle at the top varied from the absolutely perpendicular to about 55° . Toward the bottom, of course, this decreased. I am positive, however, that we many times stood on places from which there was a clean drop. As for the crest of the ridge itself, that reminded you of the backbone of what had once been an ill-conditioned comb. It may be that I am unconsciously exaggerating, though I have tried hard to be conservative. Certainly the sharpness of Swiss mountain sculpture was something I had never conceived as possible until I saw it.

Here lay the excitement. You had to make sure work of each hold of hand or foot, because if you did not, you were certain not only to come to grief, but to come to grief on an exceedingly grand scale. But there was no danger, in any proper sense of the word, because there were no chances to take. By care, and with the proper management of your body, you could make every inch of progress not only probably safe, but absolutely so. Therefore it was possible to surrender oneself with an easy conscience to the intoxication of the

most glorious sport in the world. The work changed each moment. Now we were balancing, one by one, along a narrow edge. Then would come the stump of one of the mountain's fangs, over which it was necessary to spread like spiders prepared for a cabinet, in order to avail ourselves of the occasional cracks and jutting points of rock by means of which we wriggled up, with the perspiration streaming from our faces; and then, once at the top, we had to swarm down the other side in the same way, feet, hands, knees, and often the friction of certain other parts of the body also, sharing equally in the work. Then would come a place where the crest itself was out of the question; we had to let ourselves down on one side until we could find a ledge or a crack for our toes, and crawl along with weight evenly distributed between hands and feet. It would be hard to imagine an hour of more perfect enjoyment. There was no suggestion of the dog days in the air we were breathing or in the sky. Indeed, the day was almost too brilliant for perfect beauty. One missed in the view the suggestion of the infinite, for the summits of the Oberland, far away to the Jungfrau itself, were as sharp and clear as the Dom and Täschhorn across the valley. To be honest, however, that did not bother me much. The mere climbing was satisfaction enough. To trust oneself to such rock, as firm in texture and almost as solidly based as New England granite, was a physical pleasure. This could not last; much too soon the backbone of rock seemed to sink under the snow, which rose higher and higher and finally overwhelmed it. Now came the final stage of the expedition, and the doubtful one. Although the pitch of the arête increased immediately, for the first half hour we made better headway than we had done before, as is usually possible on snow under conditions even moderately poor. But the pitch kept on increasing, and with it the steepness of the slope on either side. For a time, we had been able to diverge a little from the absolute crest, keeping a few feet down on the northeastern face. Now we were forced back on the crest again, and once for all. On our left—we were facing west—it was as though we were standing on the top of a bank of snow about fifteen feet high, resting on the edge of what was

virtually a precipice — what lay below the edge was invisible. On our right the slope was less unconscionable, probably not over 45° at first and 50° later, though this is an estimate of the reason, not of the eye. The pitch of the arête was also about 45° , increasing to 50° at the climax. Our way lay along the very edge, a few inches to its right.

It must be pretty clear that under certain conditions this sort of thing would be quite literally impossible; and as it was, I am free to confess that I should not have quarrelled if Peter had pronounced the risk a foolish one. But as he merely lightened himself of his pack, and went on without asking for my opinion, I did not offer it. I merely took what comfort I could in reflecting that all novices are timid on snow, and that the instinct of an old guide becomes almost infallible; and particularly in remembering Peter's seven children. He afterwards told me that we were fairly within the safety line, though not far; the conditions were rather bad, and on the day before he certainly should not have ventured. After a long spell of hot weather the arête becomes ice, perfectly firm, which simply gives you a job of straightaway step-cutting. Better still is to have snow which has been tempered to just the consistency for perfect snowballing, and which consequently packs firmly under each footstep. A week earlier, before the storm, we should have had the first; two more days of proper weather would have brought the second. As it was, the snow was still half powdery. There was enough adhesion to the ice on which it rested to afford some support in the absence of too great or too sudden a strain, but not enough. Consequently, for the last thousand feet Peter or Lager had to cut every step through the six or seven inches of snow into the ice beneath. It was hard work for them. As for my own part, I did not realize at the time that I was enjoying myself as much as I now know I was! It was a novel sensation not to feel sure whether one was more bored or nervous. While Peter chopped, I stood like a statue, with my feet in successive steps, leaning the upper knee against the ridge in front, and digging into the snow still farther up with the pick of my ice-axe. Peter would finish that step and move on into it, tightening the rope; then I would reach

up and take a new hold with the ice-axe, and, chiefly by its means, raise my body slowly so as to put my lower foot with deliberation into the vacant step next above, without resting too much weight on the foot which remained stationary, and above all without pushing from it. One or two trials of the exhausting effect at that altitude of a little slip and of the consequent sudden jerk to recover, were quite enough to teach one to distribute one's weight. Besides, that sort of thing was too suggestive.

There is one good point about the Weisshorn: the top you keep in view is the real top, and does not conceal half a dozen others behind it, as is the way of many mountains; otherwise this last part would have seemed even longer than it did. The other party came in sight, left the rock arête, and became distinctly visible as five black dots on the snow, and then began to overhaul us, mounting steadily in the track we had prepared for them. Meanwhile the time dragged on; our own pace seemed to grow, if possible, even slower, for the pitch now was fairly breathless, and Peter was taking more and more pains with his steps. There was a curious sense of being off the solid earth altogether, as though in a dream one were trying to fly with half sprouted wings,—and in point of fact, for more than a thousand feet below on every side there was not a spot on which one could have planted one's foot. And then suddenly I found myself looking down on the tremendous precipices of gray rock which form the western face. The climax was remarkably successful, for of late I had ceased craning my head back to count the distance still remaining. Precisely at this moment the other party caught us. We had been seven hours on the way; it was nine o'clock.

Peter stepped on the top first, and then moved down on the north arête to make way for me. Lagger and the other party, of necessity, halted in their steps. There are other snow mountains in Switzerland crowned with an undulating crest perhaps as narrow; but so far as I know, there is no other where three main ridges meet with equal sharpness in a point so exquisitely delicate. In the nature of things, there can be none surpassing it. Before Peter trod it down, the actual summit was smaller than the palm of my hand. When I

took his place, there was no room for both of my feet together; one was several inches lower than the other, planted on the beginning of the north arête. The summit of the Weisshorn certainly does not shame the most perfect mountain in Europe.

Tyndall speaks of the view as also the finest in the Alps; and in a certain sense it may be, for the peculiar situation of the Weisshorn leaves open to the eye an unusual sweep. The main chain of the Pennines, on which are Monte Rosa and the Matterhorn, throws off to the northward two great spurs. Between these lies the valley of the Visp, which we had just quitted. The more eastern of these spurs, the so-called Saasgrat, culminates in the Mischabelhörner, the Dom, and Täschhorn. At the very extremity of the western spur, standing like a sentinel, with no rival near, is the Weisshorn. Except the Dom, no one of the Pennines commands so fine a view of the Bernese Oberland to the northward and beyond the Rhone. From Monte Rosa to Mont Blanc, the whole chain of the Pennines themselves are in full view. Westward, farther still, you can see the mountains of Dauphiné in France; to the south, beyond Mont Blanc, the Grivola and the other Graians, and in the uttermost distance, a hundred miles away, Monte Viso above Turin; eastward, until they are lost in the haze on the horizon, the Alps of the Tyrol. But after all, one of these panoramic views is very much like another, and after a few climbs the power of wonder becomes jaded. Whether one cares for grandeur or for beauty, the views one would give anything to recall, and for a single glimpse of which one would travel back to Switzerland, are those of the early morning, lower down.

We did not stay long on the top. There were none of the usual chances for repose, and the wind was piercingly cold; besides, the other party could not wait forever for their turn. So Peter stepped off the ridge with the emphatic remark, "Slowly now, and take care!" For a while we made tripods of ourselves; we leaned down and buried the head of the ice-axe in the snow, and rested more than half of our weight on our arms before moving a foot. But as the slope eased off, the need of such extra precautions ceased, and we fell into the

loose-jointed and slumping gait which is usual in the descent over soft snow,—fortunately much less uncomfortable than it looks. In less than an hour we reached the rock arête, which was as glorious fun as ever. After that, our one desire—or at least my one desire—was to get down. The glare was intense; I had not eaten or drunk for six hours; I was thirsty, hollow, sleepy, and headache, —tired in fact. I had done the one thing I had been planning for and hoping for the entire year; the last climb was almost over; there was really nothing in life to look forward to,—except something cool to drink, and a nap.

The buttress gave us no trouble, excepting that, as before, it seemed to have no excuse for being. Crossing the head of the glacier was rather nasty. The place is in the direct line of fire for the stones which are collected by a gully opening just above, and which whiz down fairly often during the heat of the day. So Peter flatly declined to cut steps; we held ourselves up by digging in viciously with the picks of our ice-axes, and skated along as gracefully as we could. Once more we were bored intensely by our old enemy, the ridge of rocks, though it was simple enough climbing by daylight, if one took a little time. Once, in shinning around a big rock, just on the edge of the ice, Peter gladdened my heart by losing his hold and clattering down on his back until I pulled him in, a trifle sheepish, with the rope. Then came the hot stretch of level glacier; and, finally, the shingly rock on the other side, a tiny glissade over steep snow, more shingle, and the sleeping-place. It was half past one,—four hours and a half from the top.

My feeling about life was wonderfully changed by a square meal; in fact, I felt fresh again. Quickened by the thought of another meal in the near future, and a change of clothes, we skipped down the 4,700 feet to Randa in a little less than an hour and a half. The Weisshorn was very soon left behind us; and as we descended into the trough of the valley, and the other snow peaks, one by one, sank out of sight for the last time, it is wonderful what a roseate glow settled in memory over each detail of the expedition,—even that ridge of rocks. It is a fortunate thing in mountain climbing that this kind of glow stays by one.

Adam's Peak, Ceylon.

BY LUCY A. PUTNAM.

Read June 14, 1893.

COMING on deck the sixth morning after leaving Calcutta, we saw, to the westward, a low sandy shore, overhung with cocoanut palms and dotted with native huts. The long rollers from the Bay of Bengal were breaking on the white beaches, and above the palms rose a line of blue mountains, clear and distinct against the cloudless sky. One of these, a sharp cone that rises high above its neighbors, is perhaps the subject of more legends and an object of worship to people of more varied faiths than any other in the world.

Adam's Peak has almost as many names as there are races who make pilgrimages to its summit, or sects who revere the curious indentation in the rock with which it is crowned. To the Shivites, that indentation is the footprint of Shiva; to the followers of Vishnu, it was the eight-handed god who set his mark upon the summit of the mountain; the Buddhists call it the footstep of Buddha; and the Mohammedans say that when Adam and Eve were banished from Eden, Eve was sent to Persia and Adam condemned to stand for many hundred years upon the peak which they call by his name, Baba Adamalie. To one and all, however, it is Sri Pada, the Holy Foot, the Sanscrit name by which it is commonly known among the natives of Ceylon and the devotees who come there on pilgrimages from the mainland.

Adam's Peak is only one of the many charms of Ceylon, and we had been two weeks on the island before we had a nearer sight of the mountain than that early morning view from the deck of the "Bengal." The peak is visible from Colombo, but I never saw it. Perhaps we were too much occupied with beauties near at hand. Coming, as we did, from the parched plains and dusty cities of India, that little seaport, embowered in foliage, seemed the embodiment of all that is brightest and most attractive in tropical life. The

town stretches out for miles in all directions, affording an endless number of walks and drives. At nearly every corner is a banyan tree, under whose branches there is sure to be a little stall, where pineapples and green cocoanuts can be bought for a few cents.

In the lake are lotus and water-lilies, and from the trees overhead hang trailing clusters of scarlet and white passion-flowers. Over every wall lean feathery bamboos and the broad pale green leaves of the banana. The road is often carpeted with orange or lilac blossoms from some flowering tree, and the little huts are almost hidden among the coconut palms, that bend and sway in graceful, fantastic curves under their weight of nuts. The Singhalese say that this palm will not live far from the sea or the sound of the human voice; and certainly it never seems to do so well as when it leans benignly over the huts of the people whom it has helped to feed, clothe, and house.

The interior of Ceylon is disappointing. It is only along the sea-coast, and in the river valleys, and on a few high plateaus where the elephant still roams wild, that anything is left of the jungles and forests that made this island one of the most beautiful in the world. The greater part of the land has been cleared and set out in tea,—the dreariest, most monotonous crop that ever destroyed the beauty of a lovely country.

Beyond Kandy, the old capital of the island, the railroad from Colombo to the mountains passes through endless tea-estates. No slope seems too steep for the cultivation of that uninteresting little shrub.

Across the valleys and ravines, however, we had our second view of the mountains. Most conspicuous among them was the sharp cone of Adam's Peak, appearing first on one side and then the other of the track, as we went round curves and through tunnels, and growing nearer and steeper with every mile, until the station of Hatton was reached, the nearest point at which the railroad approaches the mountain. We did not leave the train then, but went on to Nuwara Elyia, the terminus of the line, twenty miles farther up in the hills.

This little town, which is a sanitarium for the English troops and a favorite health-resort for the people of Colombo and Southern India, lies in a high valley at the foot of Pedu-rotalagala, the highest mountain on the island. Peduro is fully a thousand feet higher than Adam's Peak, which boasts of an elevation of only 7,420 feet; but it is far less imposing in every way than that perfect cone. The ascent from the hotel and back again is a pleasant walk before the nine o'clock breakfast.

At Nuwara Elyia we could learn nothing about the sacred mountain. No one whom we met had been there or knew anything about it; but from the ubiquitous Mr. Thomas Cook, who has an office at Colombo, as at most places on the inhabited globe, we had learned that there was a "rest-house" within driving distance from Hatton, where a night could be spent, or where bedding and provisions could be obtained for a night on the summit.

We had been having glorious weather, too fine to last, we were told; but it was not until the third of February, the fourth morning after our arrival at Nuwara Elyia, that we were able to start on our pilgrimage to the shrine of the Holy Footstep.

We took the morning train to Hatton, where, after much delay and some bargaining, a carriage was obtained to take us to the Laxapana Rest-house, fourteen miles away, and bring us back again the next day.

The road lies through the inevitable tea-estates, hot, treeless, and uninteresting, and we were glad enough to reach our destination at two in the afternoon. The rest-house is clean, comfortable, and well furnished, and pleasantly situated, with a fine view of the mountain. It is quite new, and few persons on the island know of its existence; but by another season scores of tourists will doubtless make the ascent where one has done so in former years.

We were made welcome by the keeper, a dignified old man, who wore his white hair in a pug behind, crowned with a round tortoise-shell comb, in the usual Singhalese fashion. Luncheon was soon ready for us, and as we were sitting down, our red-turbaned Hindu "syce" appeared at the door,

with a profound salaam and a request for "Butter, Sahib!" We looked at him doubtfully. Another deprecating bow, accompanied this time by an unmistakable gesture. It was the usual request for a fee, the "Maccaroni, Signor!" of your Italian boatman and the "Clover fo' de donkey!" of the boy who runs beside you on your rides in Egypt. The butter was forthcoming, and the "syce" disappeared with a beaming face, leaving us to laugh heartily over the last new name for "backsheesh."

The usual way to make the ascent of the peak is to go up in the afternoon, spend the night on the summit, and come down the next morning. But this arrangement is troublesome and uncomfortable. The climb in the afternoon sun is hot, and the night in camp is sure to be cold and disagreeable. The moon was almost full, and we thought a pleasanter way would be to go up by night, starting early enough to reach the summit before sunrise. We should have to leave the rest-house soon after midnight, the keeper told us. That, as we afterward found, was too early. The sun did not rise until six, and four hours affords ample time for the most moderate climber to make the ascent. We went to bed at seven and were called again at twelve. After an early breakfast, — a late supper it was called by the rest-house keeper, who had not been to bed at all, — we started out at half past twelve with a cooley to carry our wraps and a Singhalese guide, with a small cocoanut-oil lantern. The air was delightfully fresh and cool, and the moon gave light enough to make walking pleasant, in spite of heavy clouds. It did not look as if we should have a fine sunrise; but our guide consoled us by saying it was always cloudy at night and would be clear again by four.

For five miles the road lies through the St. Andrew and Dalhousie tea-estates, winding up a deep ravine, through which rushes a muddy little stream that we crossed several times on bamboo bridges. An hour and thirty-five minutes of easy walking brought us to the *ambalam*, the rest-house for native pilgrims. There the real climb begins. The path crosses the brook for the last time, and enters the woods. At that point is a sign-board with the number 2,324 in English,

Singhalese, and Hindustani. This, we were told, meant 2,324 feet below the summit. From there to the top it is a steady climb, and in darkness not always an easy one. The trees were so thick that scarcely a ray of moonlight reached the path. Our guard replenished the oil in his little lantern, and held it well in front of him, to scare away any chance cobra that might be lying in wait for us. The twigs of the dwarf bamboo slapped in our faces, as we pulled ourselves up by the twisted roots, worn smooth by the hands that have clung to them, and in that eerie half-light often feeling startingly like some squirming snake or reptile.

At twenty-five minutes of four we reached the second native rest-house. There we stayed for nearly three quarters of an hour, not caring to have to wait too long on the summit. We had not been there long when we heard shouts and invocations to Buddha, and saw the glimmer of lights below us. Soon we were overtaken by a troop of pilgrims who had been sleeping at the *ambalam*. They were in all stages of picturesque dress and undress, and one of them carried a bandbox bearing the name of a fashionable Regent Street milliner. We were glad to join them for the rest of the climb, and to share their torches, made of palm fronds filled with fluff from the silk-cotton tree, that had been dipped in fragrant oil and spices.

Beyond the second shelter there are no large trees, and the path becomes even steeper than before, in many places leading straight up the face of a ledge of rock in which little steps had been cut. At the worst of these stairways there is a chain, but it is stretched so tightly against the rock as to be quite useless. Never before did I realize so keenly the advantage of bare brown feet over heavy English shoes.

We reached the summit at 5.05, an hour before sunrise. Such an interminable hour as it seemed! The sky was perfectly clear, though low-lying banks of clouds hid the land to the west and south. To the north rose Pedurotalagala, looking higher and steeper than from any other point from which we had seen it. Fortunately there was no wind, but the air felt raw and cold after our climb. We walked up and down to keep warm, watched the natives paying their devotions to the Holy Footprint, and examined our surroundings.

Adam's Peak is an almost perfect cone, rising sharply on all sides to the great rock that forms the summit. On the top of this is the footstep, and over it the Buddhists have built a shrine. The top of the mountain has been cleared away to form a platform, surrounded by a stone parapet. The whole is some forty feet square, perhaps more. In the centre is the rock, and near it is a small house for the priest who guards the shrine.

After the pilgrims had all come down from the rock, we too went up the iron ladder to the temple, and then the mystery of the bandbox was explained. It had been filled with flowers as an offering to Buddha,—roses, heliotrope, the long green blossoms of the areca palm, and a fragrant white flower, known to the Singhalese as “temple flower.” The footprint does not bear much resemblance to a modern human foot; it is about five feet long, and perhaps a foot and a half or two feet broad. It has been painted yellow with a red outline, and it looks as if the hand of man might have had something to do with its formation.

When we came down from the rock the pilgrims had kindled a little fire and were squatting around it, jabbering softly. The priest stood in his doorway, his teeth stained red with the betel-nut that he was chewing. We drew our wraps closer around us, and leaned over the parapet; all were watching for the dawn. The yellow line in the east deepened into orange, and then faded again into gold. One by one in the growing light the surrounding hills separated themselves from the dark indefinite mass below us. The clouds in the valleys changed from gray to pearly white. The golden line spread into a glow of primrose and violet. Long pink rays shot up toward the zenith, and then came the sun. But it was not for the sun that we were looking. Priest, pilgrims, and tourists turned to the west, and there, stretching far out toward the Indian Ocean, its tip just touching the white clouds, was the sight for which all had been watching,—the shadow of the cone. Impossible to imagine, equally impossible to describe! It did not seem to rest upon the land or the clouds, but upon the air itself,—faint and indistinct at first, but growing darker and clearer with every instant; as per-

fect in form as though drawn by a mathematician, instead of being only the shadow thrown by a mass of earth and stone. A strange, ethereal, intangible thing! For more than half an hour we watched it growing darker and shorter as the sun rose, but never for an instant losing its clear outline or perfect apex. When we could stay no longer, we turned and left it still suspended in the air, — a sight never to be forgotten.

The pilgrims lingered at the summit, and we had the path to ourselves until we reached the plantations where the pickers were at work. At the upper rest-house we stopped to make lemonade and enjoy the view. The rhododendrons were in blossom near the summit, and violets and other less familiar flowers grew along the path. Near the *ambalam* was a clump of the finest tree-ferns that I have ever seen.

It was harder to come down the mountain than it had been to go up; but in the daylight we made quicker work of it, and in three hours and ten minutes from the summit we were at the rest-house. There we rested an hour, and after breakfast drove back to Hatton, in time for the afternoon train to Nuwara Elyia.

The Land of the Causse.

Second Paper.

THE CAVES OF DARGILAN AND RABANEL. THE UNDERGROUND RIVERS OF BRAMABIAU AND PADIRAC.

BY EDOUARD ALFRED MARTEL.

Translated by FRANK W. FREEBORN. Read March 8, 1893.

ONE of the most singular features of the physical geography of the Causse is their hydrography. The large streams have no visible affluents. The rain-water, falling on the plateaus, disappears in huge sink-holes (*avens*) in the calcareous rock, and circulates through caves and gullies with which the ground is honeycombed. Here it meets beds of clay, and issues at the lower level of the rivers in the form of springs

of bluish water, with considerable force and volume. These noisy brooks, from one hundred to five hundred yards long at the most, are utilized for numerous mills. It has been proved that there is a direct connection between certain of these springs and certain sink-holes above, notably in the case at Bramabiau, near Meyrueis. It was my desire to discover how this hidden circulation of the streams was carried on, and the expeditions which I have undertaken, with the help of M. Gaupillat, since 1888, have furnished the results which I shall here discuss.

In the heart of the Cévennes (department of Gard) lies the plateau of Camprieu. Its dry surface, the bed of an ancient lake, is traversed by Bonheur Brook, which flows from the flanks of Mont Aigoual. On the western edge of this plateau the brown limestone formerly served as a dam over which the waters of the lake poured in cascades into the valley of St. Sauveur des Pourcils, now noted for its lead mines. To-day lake and cascades have disappeared. The water found a weak point in its barrier, and bored in the rock a rectangular tunnel, remarkably regular, twenty-six to thirty-nine feet high, fifty to sixty-three feet wide, and 250 feet long; when the water is low one can traverse its entire length. It is the upper part of the *ensemble* called Bramabiau. At the end of this great tunnel the roof has fallen in, leaving a huge, funnel-shaped pit. But the Bonheur does not resume its normal course. Just under the wall of rock, and leading off at right angles to the tunnel, appears a cave, extending about two hundred feet south; a yawning hole in the floor swallows the brook out of sight. Four hundred feet from there, and ninety feet lower down, the lost stream reappears in a cascade at the end of a colossal niche in the valley of St. Sauveur des Pourcils. The fall is called "Bramabiau" (the bellowing of a bull), a name appreciated by any one who hears the din of the torrent as it re-echoes from the walls of rock when the stream is full. The cascade is thirty-seven feet high. It issues from a crevice in the wall of the *causee*. A little beyond and under the dark receding roof of the fissure is a second fall, nineteen feet high, out of sight from below, and out of reach. That is the real fountain of Bramabiau. Bramabiau includes these features,—

a tunnel, an underground stream, unexplored down to 1888, and the recess and fountain of Bramabiau proper.

My first two visits in 1884 and 1885 had led me to believe that it would be impossible to follow the underground channel; the appearance of the place agreed with the representations of the natives. Many persons, they said, had made the attempt without success, driven back, one by the darkness, another by the violence of the draughts of air, another by the noise of the water, still another by the steepness of the rocks; all, in fact, by the lack of apparatus or of persistent determination. Many objects floating in the pit above had never reappeared at the outlet, and unfortunate water-birds venturing into the cave had come out at the cascade after several days in the form of shapeless masses of feathers. At Camprieu, as at Meyrueis, the enigma of the subterranean stream was believed to be unsolvable. The exaggerated stories told about it led me most earnestly to desire to attempt the passage.

On June 28, 1888, with three bold and active companions, I entered the Bonheur where it disappears at the end of the tunnel. After five hours of dangerous and fatiguing toil we succeeded in emerging at the head of the wonderful niche into which falls the cascade of Bramabiau. We should not have been able to accomplish the strange voyage had we not made a preliminary reconnaissance from below the day before. The water-course is interrupted by seven falls from three to thirty-three feet high and is 870 yards long. Besides, in drawing a plan of this stream, I measured more than a half mile of dry, lateral galleries. The river describes a nearly perfect semi-circle and receives several large tributary springs of unknown origin. All the secondary galleries are perpendicular to the main passage. At several points of intersection there are large halls from sixty-five to 130 feet in diameter, having a conical ceiling 165 feet or more above the floor. The water-ways are always narrow, from three to eighteen feet in width. These caverns look as the gorges of Fier and of Trient would, if they were covered with a rock roof. In their present condition these new wonders of the Cévennes are impassable. A considerable outlay of labor and money, in clearing, building scaffoldings, ladders, and bridges, would

be necessary in order to make them accessible throughout their length to tourists.

With our enthusiasm quickened by success, we conceived the design of traversing the entire sixteen hundred feet of thickness of a large *causse*. We proposed to enter a cavern at its outlet in a valley and to follow it to the sink-hole above. In this we were disappointed. On account of the heavy rains of 1888 all the springs were enormously swollen. Nowhere could we penetrate the *Causse Méjean*, though the caverns at several points are generally dry in summer.

For this disappointment we consoled ourselves by the exploration of the Grotto of Dargilan, the mouth of which is upon the *Causse Noir*, 1,140 feet above the bed of the Jonte, and three miles west of Meyrueis. This cave was discovered by chance in 1880, but nothing was known beyond the first hall. The largest, but not the most beautiful, was six hundred feet long by two hundred wide and 230 high. Two visits in 1884 and 1885 had made me suspect other splendors beyond, for all about the hall appeared entrances to pits or galleries which could not be explored without the aid of ladders.

In June, 1888, therefore, we undertook the systematic examination of Dargilan, and were repaid by the discovery of one of the most imposing caverns known. The full length of its ramifications reaches the total of more than a mile and a half. It has no less than twenty halls from sixty-five to six hundred feet long and from thirty-two to 230 feet high, a river four hundred feet long, and three little lakes. Its longest branch, nearly a mile long, penetrates to the depth of 420 feet beneath the entrance. The stalagmites named *Le Clocher* (the steeple) and *Le Minaret* are fifty and sixty-two feet high. The caves of *Adelsberg*, *Ganges*, and *Han-sur-Lesse* can show nothing like these. The largest pillar of carbonate of lime in the world, the queen of columns in the cave of *Arta*, in *Majorca*, is sixteen feet higher; but its proportions are less harmonious, and the tracery on its surface less delicately wrought. Among these halls let us mention that of *L'Eglise* (the church) with its organs, its pulpit, and its altar, *La Mosquée* (the mosque), *La Tortue* (the turtle), *La Grande Cascade*, *Le Cimetière* (the cemetery), *Le Tombeau*

(the tomb),—all marvellously beautiful in their brilliancy and freshness. These caverns were made accessible to the public in 1890.

We then turned our attention to the cave of Baumes Chaudes on the Causse de Sauveterre, twelve hundred feet above the right bank of the Tarn. This grotto has long been known to archæologists on account of the remarkable prehistoric remains discovered there by Dr. Prunières of Marvejols. Hardly a fourth of its extent had been examined previous to my investigations. We do not find in the depths of Baumes Chaudes huge, domed chambers, or tall towers sparkling with crystals; but the arrangement of the cavern is unique, and its geologic interest most noteworthy. Its ramifications consist of nine vertical shafts from twenty-six to 127 feet deep, and from three to thirty-nine feet in diameter, arranged in three stories and united by four horizontal galleries which cross each other in the mass of the mountain. The total length of the various branches of the grotto is a little over half a mile, its depth nearly three hundred feet. On account of the difficulty and danger of investigating these shafts it took us two days to reach the lowest one, which is a hundred feet deep and occupied by a little lake, forty feet long, twenty wide, and ten deep. In descending, I sat on a cross-bar attached to a rope, and was lowered down by five men. This descent remains in my mind as the most thrilling incident of my campaign of 1888.

After this preliminary campaign, we applied ourselves the following year to the systematic study of the sink-holes or natural pits in the CausSES. The scientific results of these researches will be given later; we should like to call attention just here to the picturesque and anecdotal side of the enterprise. It was supposed that these sink-holes were several hundred feet deep, and that they communicated directly with streams below. This is not the fact. Such communication exists only in rare cases, where the plateau is not very high. These yawning pits are of all forms and sizes, round and oblong, narrow and wide; their dark lips gape suddenly upon us, sometimes in the horizontal surface of the plateau, sometimes in a sloping hillside, sometimes in the vertical escarp-

ment of a cliff. They excite one's fear. In moonless or foggy nights many a traveller is said to have perished in them. Shepherds do not allow their flocks to approach them, yet stray cattle frequently fall into them. Local legends make their presence still more dreadful. Into one a jealous knight was seen to throw his beautiful and terror-stricken wife. In another a shepherd lost his whip, which was afterwards found by his mother at the overflowing stream several miles away and hundreds of feet below the level of the plateau. "I will send you a sheep by the same route," said the shepherd to his mother; but the poor victim struggled so hard on the brink of the pit that the shepherd alone fell in. His body was recovered at the same place and by the same hands as the whip had been. Added to these stories is the fear of being lured into these holes by will-o'-the-wisps, or of being thrown into them by highwaymen. Some of these openings, too near farms, pastures, or highways, have been covered or their rim surrounded by a loose wall of stone; but as there are several hundreds of them strewn over the Causses, it would be practically impossible to protect them all.

From 1889 to 1891, accompanied by my cousin, G. Gaupillat, and two assistants, I explored forty of these caverns, varying from 157 to 690 feet in depth. Our operations always excited alarm among the natives. The old women would cross themselves and mumble between two paternosters: "You may go down if you like, gentlemen, but you will surely never come back." As to the worthy country priests, with whom we often lodged, they loaded us with paternal benedictions. Sometimes it was only with the greatest difficulty that we could get any men to aid our regular gang in managing our apparatus. As to this apparatus, we ourselves sometimes had to laugh at the accumulation of ropes, pulleys, windlasses, gins, rope and wood ladders, picks and sledges, various appliances for lighting, magnesium, electric-lamps, lanterns, to say nothing of topographic and photographic paraphernalia, with changes of clothing, provisions, wine, and small baggage, all brought up into the mountains over most unpromising roads and on wagons with outlandish springs. All these goods are handled by a half-score of men under the orders of our two faithful head-assist-

ants, Louis Armand and Emile Foulquier, as strong, active, and well-trained as Parisian firemen. Often on their strength and intelligence depends the life of their employers and companions hanging three hundred feet below them on a half-inch rope. As to the impression produced by the extent of our baggage, we were asked one day at Ganges if we were a travelling circus, and if we had a license. At Millau I was called "a commercial traveller in the cave business." Two objects especially excited the wonder and admiration of our neighbors,—the portable canvas folding-boat and the telephone. The boat came from Osgood & Co., Battle Creek, Michigan, weighs from forty to fifty-five pounds according to the amount of equipments, and cost forty dollars. It can be put together or taken apart in a few minutes, and may be packed either in a wooden box or in two canvas bags. Wherever we find our passage underground barred by a pool or a stream we have the boat lowered down, put it together, and paddle on into the dark unknown.

In these deep shafts, generally somewhat widened at the base, the voice is lost in its own echo, and words become wholly unintelligible at the depth of a hundred feet or so. This circumstance had hampered our efforts in 1888, and the next year we could not have obtained such striking results without the aid of the telephone. We used the Branville apparatus, which is also in use in the French army. Each terminal piece is fitted both for the reception and the transmission of sound. It weighs fourteen ounces, and measures three and one-eighth inches in diameter. We had thirteen hundred feet of double copper telephone wire, fully insulated. With this our words could pass clear and distinct from the bowels of the earth through galleries and halls, lakes and torrents, to the surface of the earth, linking the explorers, far from sight, with their comrades in the sunlight above,—a great security certainly, and a powerful moral support, doubling our boldness by the confidence we felt in the possibility of help in case of need. Ours, I think, was the first application of the telephone to underground exploration.

We do not propose here to give a journal of our descents, but simply to describe our method of work, and to select from our note-book the most striking experiences.

Everywhere there were the same preliminary operations: the sounding of the pit, the placing of a beam across the mouth of the chasm to hold the pulley, the drawing of a barrier with stakes and rope around the abyss, and an apparatus to guard against any accident to the crowd of spectators, the careful coiling of the ropes on the ground so that they should not become entangled in use, and the clearing of the telephone wire. All this required some hours. Then, mounted astride a cross-piece twenty-seven inches long at the end of a rope, the first explorer descended with a second line, a safety rope, attached to his body, and carrying his precious telephone. As soon as he had reached the bottom, he began through the wire a conversation somewhat as follows: "All right; I've found a footing. There is a side gallery. I am going to see where it leads. Wait a moment." After ten minutes of silence, we hear, "Hello! hello!" "What is it?" "The gallery is thirty feet long; it ends in a vertical shaft sixty feet deep. Send down Armand and then the sixty-foot rope-ladder and something to anchor it with. I have cast off the lines; pull them up. I am going to keep the cross-stick so that it shall not get entangled in the wire; you can cut another up there. Understand?" "Yes, Armand is to go down first and the ladder afterwards." "All right; pull up." Soon afterwards a companion comes down, followed by ropes, ladders, tools, lighting apparatus, and perhaps the boat. Sometimes two or three hours are necessary for this part of our work, as the ropes and wire occasionally become twisted together, and the ladders catch on the rough projections of the rock. Such delays tried our patience. One day (at Rabanel) we lost an hour and a quarter by the rope's slipping from the groove of the pulley and becoming caught on the spindle. I was alone, four hundred feet below, shivering in a temperature of 44°. When a second shaft was followed by a third, it became necessary to collect and send down more apparatus, a long and difficult task. At Tabourel we found five successive shafts, 160, 50, 60, 90, and 100 feet deep, respectively. The long ladder had to be replaced three times, and at three points, at different levels, we had to leave men to wait for us and to draw up the ladder with a rope and fix it anew, to

allow us to climb up. Nothing can be more dreary than the long waiting of these helpers in the chilly air, cut off for six or eight hours from all communication with the explorers below and their mates above; and if either of these relays had fainted or become disabled, the situation would have been very dangerous.

The lighting of the caverns was one of our greatest difficulties. Candles and magnesium lights were extinguished by draughts and the dripping water, lanterns were broken, miners' lamps were upset, and electric lamps proved too fragile for practical use. Large candles with thick wicks gave the best satisfaction, since the magnesium could not be used constantly, as it gives out when burning certain products which, breathed for a time, have a decidedly troublesome effect on weak digestive organs. It was no easy matter, however, to hold the candle while descending a ladder or feeling one's way along a narrow chasm. Once on reaching the foot of a descent of four hundred feet by a twirling rope which made me dizzy, I was surprised to smell something burning. A feeling of warmth about my head quickly explained the cause. My hat had caught fire from a candle carelessly fastened to it. I shall keep as a precious trophy that disfigured felt which saved me the loss of a good head of hair. It is necessary, too, to guard against setting fire to the ropes by which we hang suspended, though they are generally pretty well moistened by contact with dripping walls.

All this gives an idea of the numberless nice precautions necessary to insure against not merely accidents but catastrophes, for one sports with life itself in these immense and empty caverns, where the least carelessness might mean death.

On one occasion we had been examining a pit two hundred feet deep. We had all returned to the surface, except Emile Foulquier. Hardly had the men begun to draw him up, when we indistinctly heard him calling to us. The telephone had been withdrawn. The men at the windlass kept on, sweating and puffing, and soon we made out the words, "You are crushing me." Filled with anxiety, they pulled up faster; the poor fellow's voice became fainter. I was frightened.

One last effort, and a head appeared at the brink of the shaft, then the shoulders. Strong arms grasped the sufferer, and he fell fainting on the grass. It was none too soon. The rope, badly fastened around his chest, had made a running knot, and Foulquier was nearly suffocated. A cordial gave him speedy relief, and we got off that time with a great fright; but that evening, before the lights were put out, my squad had a long object-lesson on the proper method of tying knots.

All sorts of things are found at the bottom of these pits,—traps in which animals have become caught and with which, in their terror, they have thrown themselves into the openings, fagots, trunks of trees, tools. One day we found a new wagon-wheel, for which a cartwright was glad to give my men a litre of brandy. The most annoying impediments in our explorations were the decomposing carcasses of cattle which had either fallen in by accident or had been thrown in when dead, for the natives of the Causse use these pits as a garbage dump. Often we could not have endured the sickening stench except by burning Armenian paper or incense.

The pit of Guisotte, one of the first explored, is only a single shaft of 240 feet, hardly a yard wide at the mouth. Armand went down first without the telephone. The pit is so narrow that we could no longer hear each other when he was half way down. When he reached the foot neither voice nor horn could keep us in communication. The men at the pulley tried to pull up the rope; it would not yield. This lasted for half an hour. We thought he must be dead, crushed under some block of stone, or caught under some projection. Finally I had myself lowered, and took the telephone with me. I found my Armand below, whistling a popular air. "I waited so long, but you would not come." "Well, you have given us a pretty fright; why did n't you call?" said I. "But I did call enough to crack my voice." "But we did n't hear anything." "Neither did I." "Why did n't you let go the rope? You felt us pulling on it." "I made it fast because, in going up empty, it would have caught in that crack or under that shelf up there, and then neither of us could have got it loose." "That's so; but we could not guess that." Moral: Never go down again without the telephone.

Two pits, the last explored, Rabanel and Padirac, deserve a detailed description. The first was the deepest found, 701 feet; the other led us to a subterranean stream which we followed with the greatest enthusiasm.

The pit of Rabanel is near the town of Ganges (Hérault), on the slope of the Séranne range. Its proportions are enormous. The oval mouth measures 130 feet by 80. It is a fissure in the earth 260 feet long, from 32 to 39 wide at the bottom, and 550 deep. It is connected with a vast grotto which reaches 156 feet still lower. We spent six days in the examination of this cavern, at a cost of sixty dollars. It took us three whole days to build a staging and erect two gins, 120 feet down in the pit, on a rock which had fallen into it and hung like a bridge, jammed between the sides. The first vertical descent below that is 303 feet. It takes ten minutes to lower us down; but as the twisting rope spins us round, it seems more like ten hours. The process makes one nearly wild with giddiness. The only way to keep from losing one's head is to count the turns he makes. I went down twice; the first time alone into the untried darkness, without knowing where I was going, believing that we must have misread the sounding-line, and that the 425 feet was only a part of the depth. As I was spinning around in the ascent I took a mental oath never again to go down in that pit, if I should be so lucky as to regain the open air. Four days afterwards I went down again, followed by Gaupillat and Foulquier. The spell was broken, and we shall long recall with pleasure the breakfast we ate together 400 feet below ground, sitting in the light of three candles. Then by the telephone we called on our friends above for an extra bottle of wine, which they quickly sent down at the end of a small cord. What a shout of laughter as the order went up through the wire, "Take care or you will break it," and instantly the fragile bottle stopped short, a yard only above a heap of broken rock. A childish detail, perhaps, but one which will suggest the regret that we cannot live every day a life so far removed from the commonplace. On our return I asked Gaupillat how he felt during the ascent. "I was considering from what height one could fall with the certainty of being killed outright." But what a fairy spectacle

we had down there! The descent of 425 feet does not bring one to the bottom of the shaft. He lands on a talus, 115 feet high.

In the side of the pit is the entrance to a grotto, the largest hall of which is 200 feet long, 80 wide, and 140 high. From the middle of the pile of *débris* the eye takes in the spectacle of a genuine church nave, narrow but nearly 300 feet long, elevated 450 feet, and pierced at this prodigious height by an oval window looking straight out into the blue of the sky. From it the light comes sifting down, bathing in purple reflections of various shades the stalactites which hang like crystal tears along the walls of the pit. Here surely is a sight never granted to mortal vision, and beyond the power of human imagination to conceive. Even the camera failed to catch it; our plate only showed a white spot between two black stripes. Farther back the grotto is superb, and would make the fortune of a Swiss village. It encloses a second pit, 85 feet deep, for the exploration of which we had to lower our rope-ladder to the depth of 630 feet; but its gleaming, frozen cascades of carbonate of lime did not arouse our enthusiasm as the great pit itself had done. Why is it that so many splendid sights must be inaccessible?

Before leaving the pit, we waited while our men above slowly drew up our packages of ropes, ladders, and other tools. One of these, badly fastened, became loose just as it reached the top, and rained its contents, hammer, drills, canteens, camera-tripod, lanterns, etc., down upon our heads from a height of 300 feet. The smallest of these objects would have cracked our skull. Fortunately we were able to stand from under.

But the marvel of the campaign was Padirac. There, 350 feet below the surface of the plateau, we found a river, hitherto unknown, on which we floated for more than a mile without finding the end of that new Styx.

In the Causse de Gramat, not far from the village of Miers, in an open field, there is a huge round hole, 115 feet in diameter. No sign of it appears until, coming suddenly to its very margin, one instinctively shrinks back. The sounding line shows 247 feet of depth at the side, but it is only 182 feet

to the top of a heap of stones on the floor of the pit. This is the Puits de Padirac.

On July 9, 1889, accompanied by my cousin, G. Gaupillat, with Louis Armand and Emile Foulquier, I descended by a rope-ladder of one hundred and eighty steps to the summit of the heap of *débris*. The impression as one looks up is very striking. He seems to be at the lower end of a telescope, with a circular bit of blue sky for object-glass. The vertical rays throw a strange light on the steep and sometimes overhanging walls. Around the margin, and from all the projections of this enormous cylinder, hang long, graceful streamers of plants that love shade and dampness. The rope-ladder swings among them, and our slender telephone-wire looks like a dark spider's thread across the chasm. At the foot of the talus there is a square opening in the side-wall of the pit, 65 feet high. We enter it, and following its gently-sloping floor we reach, at the depth of 280 feet from the mouth of the pit, the entrance to a dark, unexplored gallery. We light our candles and proceed. A few steps in, and we hear the rippling of a small stream; at the depth of 325 feet we come to a little pool of water, half covered by a low roof of rock. This is the secret source of open air streams. It is formed by the collection on a bed of clay of the rain-water filtering through the rocks above. We follow the little stream for 490 feet, when it suddenly disappears beneath the stones. It doubtless passes under the heap of *débris*, and reappears in the cavernous opening which we had noticed on the other side of the great pit. This second opening is a very narrow, steep slope, with a vertical descent of 100 feet, at the foot of which the lost stream reappears at a depth of 324 feet.

Here the scene changes. It is no longer a chasm or a tunnel which greets our astonished eyes, but a stately gallery, from 32 to 130 feet high, and from 16 to 30 wide. It runs directly north. We follow the stream, which is continually increased in volume by the drippings from the ceiling and walls. Legions of bats fly about in terror at our intrusion. However far the almost solar light of the magnesium reaches, we cannot see at once the end of the imposing gallery. Turning

here and there, crossing two or three pools, we advance for 300 yards, when we find our way barred. The water occupies the whole floor of the tunnel, and is several yards deep. But we need not stop for that. We have above ground our two bags, containing our boat, which accompanies us in all our subterranean wanderings. But it is seven o'clock in the evening, and I insist rigidly on sleeping always above ground. It will take us two hours to extricate ourselves, so we face about and leave the rest to the morrow. We issue from the pit safe and sound at nine o'clock, eat our supper in the open air, and pass the night with our six helpers stowed in and under the omnibus which brought us, bag and baggage, from Rocamadour.

At six the next morning we all four descend, with the boat in its bags, and at ten Gaupillat and I are floating free along a wide river from 16 to 26 feet deep. Armand and Foulquier are left to wait for us. Four candles are fixed in the gunwale of the frail boat, and the magnesium reflector in the bow does not fail us for a moment. One of us keeps a watch out ahead, and the other paddles quietly along in the limpid but almost stagnant water. We proceed in this manner for 360 yards, under a roof 130 feet above our head. We are mute with surprise. Soon the silent river begins a feeble rippling; a few rocks encumber its course. We have to disembark and carry the boat to the other side of the little rapids. What we saw then cannot be described. Four lake-lets, formed by the expansion of the river, follow each other in quick succession. As in the most beautiful grottos known, the walls are draped with a brilliant covering of stalactites and stalagmites. Detached columns, pendants, girandoles, more than sixty feet long, hang from the ceiling to the surface of the water. Along the sides rise tiers of crystal bouquets, fonts, statuettes, and spires, all of glittering white. Under the bright magnesium light the reflection of all this beauty on the smooth surface of the water redoubles its splendor. No sound disturbs the impressive stillness, the water beneath us is perfectly quiet; only the drops of water falling from the roof sound sharp or dull, silvery or muffled, according to their distance,—dead and dull upon the river,

sonorous on the stalagmite; and their echo combines all these notes in a melodious song, sweeter and more harmonious than the dulcet tones of the upper world. No human being has ever preceded us in these depths; no one knows where we are or what we see; we are isolated, far from all contact with life. Nothing so strangely beautiful was ever before presented to our eyes. With one accord we ask each other the same question, "Are we dreaming?"

The passage containing the lakes is not more than 200 feet long by 50 wide. Thus far the navigation is very easy, but difficulties increase at every step. First the stream is narrowed between stalagmites until it is only a third of an inch wider than our boat. By good fortune we get through, for the walls are vertical, smooth, without projections in which we may step, and the water is several yards deep.

Next comes a second rapid, followed by thirty others. These bars are a curiosity in themselves. Built in the form of a semicircular dike of stalagmite, concave in the rear, convex in front, they form small reservoirs, looking like pot-holes. Their crystalline edges, delicately carved and fringed like white coral, lie at the surface of the water, and are hardly more than an inch thick. On the upper side they are hollowed out under the water, and on the lower side they present a rounded surface over which the water glides in a thin sheet. At each pool we step out upon the fragile dam and lift the boat into the basin below. Thirty-two times, with our candles between our teeth, we repeated this dangerous manœuvre, and more than once an accidental slip gave us a complete bath. The basins are from $1\frac{1}{2}$ to 13 feet deep, and the largest is about 26 feet long.

Between the second and third pot-holes the overhanging rock comes within a foot of the water. We have to crouch down in the boat, which fortunately rises only eight inches above the surface, break off the stalactites which hinder our passage, and work our way along by pushing with our bended back. This passage is about 18 feet long, and we slide through as in a groove.

Beyond the third basin comes the Pas des Palettes. The fissure through which the river runs here is too narrow at



LAC DES BOUQUETS [PADIRAC].

From a Flash-light Photograph by G. Gaupliat.

the surface of the stream for our boat to pass. We had to get out, stand in the water up to our waist, unscrew the adjustable blades (*palettes*) of the paddle and the oars, place them from rock to rock across the gallery where it is wider,—that is, considerably over our heads,—raise the canoe at arm's length, and, resting it on the blades, slide it along until the passage became wide enough to allow it to float again. Once an oar-blade slipped and the boat came down upon us. After that we took our craft on our heads and felt our way along, holding on to the smooth protuberances of the walls. If the bottom of the boat had been dry, we might have set it on fire, as we had to carry our candles in our teeth. At last we halted at the edge of a circular lake, 150 feet in diameter, filled with a great number of stalagmite basins and islands. The ceiling is hardly 45 feet high. While Gaupillat lights my way with the reflector, I explore the lake, stepping carefully along the edge of the caldrons, and find a place where the stream turns to the left and leaves the chamber. I return by the other side of the lake, where there are fewer caldrons, and where, therefore, the boat could get along more easily. But the shore is a steep, slippery bank of clay, and by the breaking of a treacherous bit of rock in my hand I am dropped into the water. The cold bath (the temperature was 57°) was not at all disagreeable. The worst of it was our matches were wet. Our advance was a veritable illumination. Six candles were stuck up on the gunwale of the canoe for fear some one might be extinguished,—a wise precaution, for on our return a careless movement on our part put out five at once.

Beyond the large lake the pot-holes follow in quick succession; the fifteenth leads into a sixth lake, 114 feet in diameter. Nowhere, not even in the gallery, the width of which is pretty uniformly from 6 to 15 feet, is it possible to land; the side walls drop perpendicularly into the water, which is over 20 feet deep. There are several sharp bends, but the general direction of the cavern is toward the north.

Beyond the seventeenth pot-hole we begin to be crowded; the stream is only 28 inches wide. Frail cornices offer untrustworthy support to our hands. Standing astride the

chasm, five feet above the water, we raise the canoe with our boathooks and slide it along, tipping it on one side. Its canvas sides scrape the rock, its ribs creak, but nothing breaks, and thus we get through the Pas des Etroits in safety. Passing two more pot-holes and a gallery free from stalactites, we reach a nearly hemispherical chamber about 65 feet high. This appears to be the end. The walls seem to be without further opening. We decide that the river doubtless disappears below. In this we are mistaken. In a corner of the wall we find a tunnel rather wide but only 20 inches high. There is no fissure over it. The rock seems to change in character. Still, there comes to our ears through the tunnel the echoing music of the distant dropping of water. How far will this marvellous journey extend? We hold a council. It was raining yesterday; this morning it was still threatening; perhaps in the seven hours we have been below ground the very windows of heaven have been opened and the river is rising. Should we be able to get back if we go on? What matter? The unknown is still open to us, seductive, irresistible. Forward, then! The tunnel proves to be 32 feet long, and leads into a cavern, the ceiling of which is 100 feet high. A little farther on we pass the eighth lake, the largest, 250 feet long, and 65 wide. We name it La Chapelle from its having a recess like the apse of a church. Beyond this the gallery leads through nine pot-holes not far apart.

A hundred feet farther we hear the water rippling over the edges of the thirty-third pot-hole. Then the gallery leads off to the left. How much farther would it lead us? We must leave this question unanswered, as it is high time for us to think of our return. We are dripping wet; the chilly water is beginning to benumb our limbs. Our stock of candles is nearly exhausted. It is two o'clock; for the past four hours we two have paddled and carried our canoe alone. We are more than half a mile from where we left Armand and Foulquier, and a mile and a quarter from the foot of the pit of Padirac. We are thoroughly fatigued, and our upward exit will naturally offer more obstacles than our descent. With sadness, then, we begin our retreat, and leave further exploration to the next year, for our vacation is at an end.

For two hours and a half we continued our retreat along the marvellous subterranean way, with no great difficulty since we knew just what we were to expect. But we had to review carefully our topographical sketches and to estimate as exactly as possible our distances, in order to make a map, without which our future accounts would run the risk of passing for a romance.

At the great pot-hole, the ninth, our weary arms refused farther service, and we had to drag our unfortunate canoe over the rough edge of the stalagmitic barrier. The canvas hull was torn in the operation. We stopped the leak as best we could, but henceforth we had to bail constantly. At last the *Pas des Palettes* was passed with great difficulty, and we reached the end of our toils at the four lakelets, and were able to admire their beauty in comparative comfort. A few minutes more, and we had paddled through the 360 yards of the smooth reach, and at half-past four, after six and a half hours of absence, we rejoined our two companions. We found them very anxious on our account; Armand was already thinking of organizing a rescue party. At seven o'clock we were all four again above ground with all our equipments. We were no little delighted to exchange our wet clothes for dry ones, and, sitting down in the glory of a magnificent sunset, to refresh our inner man after thirteen hours of complete abstinence from food and drink.

In September of the following year, 1890, my brother-in-law, M. de Launay, professor in the School of Mines at Paris, joined me in a further exploration of this Cavern of Padirac. On this occasion, by remaining twenty-three hours under ground, we succeeded in reaching the end of this cavern, which is completely closed in at a point about 600 yards beyond where we had turned back in 1889. We also discovered a new side grotto of great beauty, from 220 to 260 feet high, containing two little lakes curiously placed, one a hundred feet above the other.

Though not having any outlet, as we had supposed, in some fountain along the Dordogne, the subterranean river of Padirac is one of the greatest curiosities of the country. Its entire length is nearly two miles. It descends about 100 feet,

flowing over 36 dams of stalagmite, varying from 32 to 18 feet in height. It expands into twelve lakes from 33 to 250 feet in diameter. The height of the roof above the water reaches 133 feet, and the depth of the water often exceeds 20 feet. In places the walls are hung with a wonderful tapestry of stalactites gleaming in the light of the magnesium reflector. When Padirac shall be made accessible to tourists, they will find it a perfect fairyland for wonder and beauty.

Padirac is a huge reservoir for several streams which have their exit at Gintrac, a mile to the north. The communication is made, however, by infiltration between beds of clay.

It was once thought that the sink-holes and other pits found in this district were due to the falling in of the surface, and that they marked, like man-holes, the course of subterranean rivers. In reality they are merely ancient fractures which fierce torrents have enlarged by erosion. The sinking of the surface is of course an important factor in their formation. These chasms communicate with underground streams only where the stratum of the ground to be traversed happens to be thin enough, and where certain coincidences exist between the surface fracture and the inner crevice in which flows the hidden stream.

The following are my conclusions regarding the hydrology of the limestone plateaus of the Causse. The sink-holes pierce the upper strata of the compact dolomite, at the base of which the upper surface of the marls collects all the water trickling from the caverns through from 300 to 800 feet of soil. This water oozes through the marls, following very thin fissures. Then, reaching the lowest stratum of dolomite, the water wears for itself a fixed bed, and the stream is fed by the drippings from the walls of the cavern.

It seems clear from our investigation that caverns have played an important part in the formation of valleys in calcareous soils. The shape of the galleries of all the caverns explored, lofty and narrow as they are, and perpendicular to each other, enable us to explain the origin of the cañons of the Causse. What the stream of Bramabiau is doing to-day, the more abundant waters of an earlier epoch did at the expense of the upper dolomite formation of the Causse. They

began by following crevices already existing in the soil. These crevices grew into caverns. The action of the underground water-courses gradually wore away the supporting pillars of these caves and allowed their roof to fall in. The rivers then ran in the open air, swept away the *débris*, and still further deepened their bed in the friable marls until they reached the lower dolomite, on which they flow at the present day.

From 1888 to 1891 we explored forty caverns, twenty-five grottos, previously unknown, and travelled over thirteen miles of galleries and streams under ground. And this is but a beginning of the work of exploration.

An Ascent of San Francisco Mountain (Arizona) and the Homeward Route.

By C. H. TYLER TOWNSEND.

Read February 8, 1898.

WE started on our return to Flagstaff, after the visit to the Grand Cañon of the Colorado,¹ with the determination to stop and climb the San Francisco Mountain, whose summit we had seen covered with snowbanks when on our way to the Cañon. On the second day we arrived at Hart Little Spring about 2 P. M. This being about the best place we found for collecting insects on the whole trip, we devoted the rest of the day to this work. That night, Mr. Cordley and I started after supper, which was finished about dark, for a small lake a mile and a half nearer the mountain, where we thought it likely we might see some deer the next morning. It was dark when we started, each with our guns and a blanket strapped on our shoulders. The trail lay through thick woods, over fallen logs and rocks, and up wooded slopes and gulches, yet we kept it with some difficulty, and found the lake about 9.30 P. M. Here

¹ See APPALACHIA, VII. p. 48. A Wagon-Trip to the Grand Cañon of the Colorado River.

we rolled ourselves up in our blankets, but saw no game, and returned to camp next morning in time for breakfast.

It was Friday, July 15, that we left the Hart Little Spring at 8.00 A. M. on foot for the top of the peak. The plateau upon which the San Francisco Mountain stands is between 7,000 and 8,000 feet above sea-level, while the summit reaches an elevation of 12,794 feet, or fully 5,000 feet above the plateau. The Hart Little Spring is at an altitude of less than 8,500 feet. The fauna and flora of this mountain, and the surrounding region, has been worked up by Dr. Merriam, of the Agricultural Department in Washington, who had his camp for a considerable time at the Hart Little Spring.

Each man of our party carried on his back his lunch and a canteen of water, but nothing else except collecting necessities, as we expected to return the same day. I carried my net and collecting vials, and collected all the way up, taking many rare and interesting specimens. For some time we kept on through what is known as the balsam-fir zone, passing the lake where Mr. Cordley and I had camped the previous night. Soon after we reached the base proper, where we began to ascend more rapidly, and then entered and traversed the spruce zone, which extends to timber-line. Each man struck out more or less for himself, as there was no trail the way we had thought it best to go, and all one could do in the woods was to keep climbing up the highest ground he saw on the main ridge that was being followed. Occasionally we would come to an open glade on the mountain side, where we could take note of our progress. A detachment of the party had spread off to the right on another ridge some distance back, but we kept on leisurely, collecting as we went. The climbing was not at all laborious; it only required persistent walking up a moderately steep slope; and for this reason San Francisco is a model mountain to ascend, though it is quite a little walk to the top. We had to proceed cautiously, over ground carpeted with spruce needles, and over fallen trees with the bark off, as we found by experience that, under our leather shoes, both were very slippery, and we narrowly missed some bad falls. The slopes of the mountain are covered with grass and various plants among the trees nearly all the way up to timber-line,

and we saw many beautiful flowers. One thing attracted my attention particularly. As we neared the timber-line, we could see, here and there, from open spaces, large whitened areas of dead conifers (spruce, I suppose) on the sides of the mountain, especially on the north slopes, and about opposite to or a little above us. The trees were of moderate and nearly equal size, and these large dead areas were contiguous on all sides to living trees of the same size, as though a withering blast had swept down upon them and utterly destroyed those that it had happened to strike. I accounted for this fact by supposing that deep snow-drifts had formed on the northern slopes the winter before, and had entirely covered such patches and winter-killed them. We later saw many more immense patches on the mountain side. At length we reached the timber-line, where the spruce and the fox-tail pine maintained a precarious footing as a gnarled and scrubby growth.

After passing the last of these, the summit still towered up at the same gradual ascent for nearly 1,300 feet, being one stretch of loose volcanic rock, save the patches of alpine plants here and there, which gradually grew less frequent toward the top. Professor Hagerty, being a feather-weight and not impeded with a mania for collecting, was the first to reach the summit, at 11.40 A. M.; Mr. Larkin arrived five minutes later, and Mr. Swarthout at 11.55. I was the next to reach the top, at 12.05; then Professor Tourney, who is rather a heavy-weight, came blowing over the crest at 12.15, and immediately sat down before he could get wind to shout. Professor Wooton arrived at 1.00 P. M., though he is a feather-weight. Mr. Cordley had been quite miserable with a bowel complaint for a week past, and was unable to get much above timber-line, being taken with nausea. This was not to be wondered at, considering his somewhat weakened condition. I give these data to show what effect the altitude had on the party. In my own case, I did not experience any difference in the amount of oxygen at the top. That is, I breathed as satisfactorily there as at the bottom, and could hardly have told that the pressure was any less. But it was much colder, there being some clouds and a cold wind from the south-southwest.

The level area at the summit is small. Here we ate our

lunch. On the very top is a large pile of rocks, and here several tin cans containing names of persons who have visited the summit were found. Among those whom I knew personally or by reputation were Dr. and Mrs. C. Hart Merriam; Mr. Vernon Bailey, who was Dr. Merriam's assistant; and Professor D. T. MacDougal, a well-known botanist. We all likewise registered. There were some large snow-drifts on the north side just below the summit, and also in a place on the southeast side, which was somewhat sheltered from the sun. They had melted much since we first saw them, on our first approach to Flagstaff from the east, and even since we passed the mountain on our way to the Cañon. They were long, narrow, and rather deep, and lay usually with their long axes nearly up and down the slope. We went down to the drifts and threw snow-balls. Some of the party ate their lunch while seated on a snow-bank.

We left the summit a little after 1 P. M., after noting the splendid views of the surrounding country. There were buttes and cones, stretches of forest-clad plateau, and bare plains and extinct craters, some of which contained lakes. The rim of the Grand Cañon, only forty-five miles distant in a straight line, could be located in places, but we could not follow it satisfactorily. The view was not at its best, since the sun was obscured by nearly stationary cumulus clouds.

We descended faster than we came up. Below the larger quite evenly broken masses of rock that are near the summit, there is much loose volcanic gravel; and down this I went at a rapid gait; then through the timber-line zone of stunted trees, and down along the forest-clad slopes. While wildly chasing bugs, I got off the ridge I had intended to follow, and branched off on a more southerly one. The Arizona party were ahead somewhere, the rest of the New Mexico party I had left behind at the beginning of the descent. I concluded, however, to stick to the ridge I was on; for I could not well lose my way, and it was leading in about the right direction, as I could see from openings among the trees which I occasionally came upon. I went through places that were thick and dark with huge forest-growth, then across large open grassy areas, then through young and thick poplar woods,

then down steep inclines, and around great masses of rocks, and across defiles, the whole thickly wooded. I now had less opportunity to take note of my bearings, since I was getting lower and the openings among the trees became less frequent. Bears, mountain lion, and other wild animals inhabit the recesses of this and the adjacent mountains; and it several times occurred to me, when I was trying to get through particularly dark, thick, and rocky places in the woods, into which I had stumbled, that I would stand a pretty poor show if I should suddenly run against one of these animals, with only an insect net to defend myself. Such a contingency, happily, did not occur. At last I reached an open place near the foot, crossed and recrossed by cattle trails, and looked in vain for some sign of the vicinity of the lake we had passed in going up, where Mr. Cordley and I had camped the night before. I determined to follow a cattle trail, as that must lead to water; but after going a half mile abandoned it, since I believed it was taking me out of my way. I then came to the conclusion that it would be easier for me to find the camp than the lake, which was somewhere a mile and a half this side of it. Keeping on, therefore, in that direction, as nearly as I could decide, and conforming my course considerably to the topography of the locality, I finally brought up on the road about a mile or two south of the camp, which I reached before the rest of the New Mexico party. The Arizona party had been in some time, and were engaged in packing up. The road I came in by, from the south, turns to the east for a few rods around a large wooded hill to reach the Little Spring. Of course they were quite surprised to see me walk in from that direction, which is quite opposite to that of the mountain, and laconically asked me where I had been. I said that I had just split off around the hill to see how the collecting was. They appreciated the joke, and then we all shouted. About a minute later the vanguard appeared. They had tried to follow a wooded cañon down, and had gotten the worst of it.

I now mounted, pinned in boxes, and put away seventy specimens of insects that I had collected during the day, the party in the mean time hitching up. At just four o'clock we got under way, and reached the A 1 Ranch of the Arizona

Cattle Company about sundown, passing the point where I had struck the road after the first mile or two. The distance to the above ranch was ten or eleven miles.

The next day we reached Flagstaff, transacted all necessary business, including the laying in of a new supply of provisions, and said good-by to the Arizona party, in whose company we had spent so many pleasant days. Professor Hagerty also left us, to proceed by rail to California.

We left Flagstaff July 17, about noon, and reached Turkey Tanks, fourteen miles east on the road, about 5 P. M. Some distance before we arrived there we met a man on foot driving three pack-animals before him, and evidently trying to make double-quick time to Flagstaff. He warned us to look out for Indians on this road, saying that the Navajos were on the war-path. We knew they had killed a white man by the name of Lot Smith, about two weeks previously. We also knew that possible trouble was looked for, as the Indians had refused to give up the braves who had killed Smith, and the Government had threatened them with troops. This man said that he was on his way up into the country near their reservation, when the authorities ordered him out as fast as he could go. He told us that the whites were fortifying in Winslow, and along the railroad. We were now ninety miles from Holbrook, and the road lay alongside the Indian country all the way. It was fifty-five miles to Winslow, with no settlement between, not even a ranch, excepting a deserted sheep-ranch, and off from the railroad. But we decided to keep on. The probability was that even in case of an uprising we could get to Winslow in time to escape it. So we took the chances, and kept our eyes wide open for signs of red-skins on the horizon. I comforted myself with the remark that if the Indians captured us, they would at least secure a very complete outfit for collecting bugs, — which possibly it would puzzle them to use.

At Turkey Tanks there are two immense natural reservoirs of water in the solid rock. Of these the east one is inaccessible to horses and cattle, and the water is consequently quite good to drink; the other can be reached with little trouble by animals. Here we camped and dreamed of Indian wars.

We were another night on the road before reaching Winslow, but, with our usual good fortune, saw no Indians. We passed on through Holbrook, and followed the railroad to Carrizo. Here we took the road six miles to a ranch, where we left our wagon and started on horseback for the petrified forest, five miles away. We returned the same day, laden with many specimens, and proceeded toward Navajo Springs.

The petrified forest claims a word in passing. It is a wonderful region, several square miles in extent, strewn with fragments of all colors, and sections of logs in jasper, agate, flint, etc. Great numbers of logs from six to seven feet long, and from three to more than four feet in diameter, lie around intact. Some still stood in the ground like stumps, and apparently in their original position. I brought home a fine block of jasperized wood.

From Navajo Springs, we went south and then east, striking the Zuñi River, which we followed up to the pueblo. From the windmill of the G. Bar Ranch, which is about thirty miles below the Zuñi pueblo, or village, to a few miles above the ranch itself, the road to Zuñi keeps along the river, or creek, of the same name, which here flows down a small cañon. This portion is entirely in Arizona. On the smooth face of the rock along these low walls, or on detached masses of rock by the roadside, we saw much curious picture-writing and hieroglyphics. There were rude figures of animals in one or two cases; more often the stone was ornamented with apparently geometrical figures. All sorts of designs were exhibited, and these continued more or less for some six or seven miles. At noon we had to cross the river. It was very miry, and the opposite bank impassable by the usual road; so we floundered through at another place with the animals and wagon, and with a fearful jolt struck a steep bank that we came near not getting up.

We finally reached Zuñi, and met Mr. Douglas D. Graham, who has resided there eleven years, and to whom we are deeply indebted for many favors. We spent three interesting and very pleasant days at the pueblo, — pleasant, indeed, in his company, and that of four artists from Philadelphia, who were making a two-months' stay there, sketching, etc. These

gentlemen (Messrs. Whiteside, Fitzgerald, Norris, and Preston) had many interesting and valuable sketches and paintings, of the Zuñis and their village. They also had made a good collection of curiosities, and each owned a Zuñi costume, which they wore occasionally. They occupied the very rooms at Mr. Graham's place that Lieutenant Cushing occupied when he was there for five years. I at once had made a Zuñi suit, or costume, and a pair of moccasins, and also bought a pair of sheepskin leggings. The next day the Zuñis had a rain and game dance, and we all went over to the town in our native costumes, and saw the show. I suppose the Zuñis thought we were the show. We judged as much from the attention they gave us. They seemed to think that it was very queer for a white skin to be covered by a Zuñi costume. Their dances were most elaborately gotten up, especially the point in the game dance where the so-called "mud-heads" appear. A certain number of dancers in this case wear a mud cast of a head, which gives them a most odd appearance. A medicine dance was in progress the afternoon before, which we had already seen. It was accompanied by girls grinding up some kind of a green herb with slabs of rock. The juice was drunk as a cure-all medicine. Their cookery and the way they grind corn is interesting. They are great singers also, in their own peculiar way. One old fellow was induced to sing us the hunting song one night; but as it takes two hours to sing it, we called for the first and last verses only. A volume could be written on what we saw in Zuñi in those three days.

We reluctantly left Zuñi on the 31st of July, saying good-by to Mr. Graham and the other gentlemen as to old-time friends. We proceeded to Ramah and Tenaja, visiting Inscription Rock on the way. This is a high vertical cliff of white sandstone, about fifteen miles southeast of Ramah, and only about three miles west of Tenaja. It is covered with hundreds of names cut in the rock, from those of the earliest Spanish explorers down to the present time. I found one in Spanish and with the date "Feby., 1526" cut in the rock beside it. This may have been done by one of Cortes' followers. There are names of many Americans who passed

here in the "fifties" and "sixties." Some names are cut in with as perfect lettering as though done by marble cutters, and perhaps suggest the profession of the persons who did it. It is certainly an interesting place to visit.

Thirty miles across the mountains from Tenaja brought us to Grant, on the Atlantic and Pacific Railroad. This route was extremely picturesque, and not so rough as where we had crossed between the San Francisco and Datil ranges going up. For the last eight or ten miles in leaving the mountains the road came down a long, narrow, and windy canon. We followed the railroad to Los Lunas, and then following down the Rio Grande valley, without further noteworthy incident, reached Las Cruces August 14. We had thus driven over 1200 miles in two months, and our horses were now given a much needed rest.

Up to the Craggs of Sir Donald.

BY CHARLES E. FAY.

THE appearance of the Rev. Mr. Nichols's article in the present number of APPALACHIA is a circumstance of more than ordinary interest, inasmuch as it is a pioneer article, putting upon record the first ascent of importance made by a member of our Club among those beautiful Cis-Atlantic Alps, the Selkirks. We do not, of course, forget that Mr. Emil Huber, who with his companion Mr. Carl Sulzer, made the conquest of Sir Donald in 1890, is a Corresponding Member of our Society, but his membership dates from the year following that notable ascent; and again, while it was the good fortune of the Club to listen to his enthusiastic account of that busy summer's activities in British Columbia, illustrated with a wealth of lantern slides from his own negatives, a few brief lines under the heading "Proceedings of the Club" is the only trace that this event left on the pages of our magazine.

Not that the circumstance here related is in any way comparable in interest or importance with the ascent of Mt. Fox, but because it always has been the mission of APPALACHIA to gather up fragments that may have an interest for those who frequent the mountains, do I venture at this somewhat late date to record the brief story of a morning's excursion from the Glacier House.

It was made on September 6, 1890, in the last quarter of the unforgettable twenty-four hours allotted for a stay here by an unelastic itinerary. Mr. J. R. Edmands and myself had reached there shortly after noon of the 5th, and had been exasperatingly disappointed, immediately upon registering at the hotel, to learn, not merely that Messrs. Huber and Sulzer had taken their departure the day but one preceding, but that we had actually been in close proximity to one another for ten minutes without knowing it as our trains passed each other at Westminster Junction. We had parted from them at Boston in June with the understanding that we would be on the lookout for each other as we made our transcontinental round trip in opposite directions.

To me this was a greater disappointment than to my companion, as our long summer's programme of climbing and travel had wearied out his usual enthusiasm; and, indeed, I may confess for myself that within a week, as we had passed by rail over a spur of Mt. Shasta and by steamer in full sight of Mts. Rainier and Baker, I had felt no trace of importunate desire to scale their snowy flanks. But now it was obvious that the sentiment was only sleeping; for as our train speeded up the loops of the cañon of the Illecellewaet, and the snow-fields of Mt. Bonney, the shaft of Sir Donald, the slender pyramid of Cheops towered almost within handreach, it seemed impossible to think of passing on without a more intimate acquaintance. They seemed to be meeting us more than half-way. And, of course, if Huber and Sulzer had been there, after their six weeks of sojourn they would have had "something worth while" to propose for the sole day at our disposal.

The afternoon of the day of our arrival I had passed in prowling about the lower portion of the Illecellewaet glacier.



MOUNT SIR DONALD.

From the Northwest.

Photographed by Emil Huber, S. A. C.

At no time did the phenomena of crevasse and moraine entirely divert my eye from studying possibilities for the morrow. That of attacking the peak of Cheops especially allured me, and it looked perfectly feasible for a single day; but, if my companion might not be inspired to undertake so much, perhaps he would be persuaded to an easy "stroll" up to the crest of the ridge bounding the glacier on the southwest, or else to the summit of the ledgy peak that looks immediately down on the hotel from the northeast. Vain hopes! No allurements I could offer that evening proved sufficiently seductive, and we retired for the night with the understanding that we should continue our journey eastward by the morrow's train.

Before that morrow's sun had seriously threatened the thick coating of frost that was sparkling in unbroken whiteness on the station platform, I was making a final appeal at my friend's door. "I am going up that northeast peak between this and train time. Will you join me?" "Not to-day." "All right. I am going alone. If I am not back in time for the train, I will overtake you at Banff. Good-by."

The "good-by" was premature. The Glacier House had not then become, perhaps, so much of an Alpine hostelry as Mr. Nichols found it last summer. I found it impossible to secure in advance, at least without previous notice, the necessary meal, so the breakfast table afforded one more opportunity to waste inducements on my obdurate companion between hastily-eaten dishes.

And so it was 7.45 before I got off, and only about six hours were available for my trip. The easiest route seemed to me not to make directly for the peak, but to swing around to it from the eastward, starting in as high up as the foot of the glacier. On leaving the house, I must have made the mistake, so easy to one who is climbing alone, of taking too swift a pace, for in half an hour I had passed, on my right, the glacier's foot, and shortly came to the end of the path that had been cut farther through the low growth on the moraine to a point at which a small stream comes down over the steep northerly slope. Taking to the bed of the now almost dry torrent, I climbed up a few hundred yards, and then bore to the

left, intending to proceed more directly through the low timber toward the ridge leading to the peak it was my purpose to scale. But I had counted without adequate appreciation of the impenetrability of Selkirk "scrub," of the amount of strength required to force aside those tough boughs. The slow progress was the greater surprise as there were no "jackstraws." One could plainly see all that he had to contend with, and it was a higher growth than the familiar spruces of our Eastern mountains; but it was like trying to force one's way with the football against a champion team of heavy weight. A five minutes' trial sufficed to assure me that my companion would probably be on his way over Rogers Pass before I could get high enough to wave him farewell from the rocky slopes toward which I was striving. There was nothing to do but to pull out of the brush and look for something feasible.

Just to my right the low growth ended. Beyond it the footing changed to plain travelling over an upward sloping expanse of rocky fragments through which, at a less marked gradient than at first, the brook up which I had begun my ascent was flowing. At a distance of perhaps a quarter of a mile the stream plunged over a steep ledge some thirty feet high. Toward this I made my way, crossing and following near to the brook. The only difficulty was occasioned by the slipperiness of the stones; for they were covered with a coating of ice perhaps a quarter of an inch thick, which now under the rays of the sun was breaking up and falling off with a glassy tinkle. At the same time the daytime music of the streams at all the sources of the Illecellewaet was increasing in volume as the frost relaxed its hold upon their waters.

My attention being no longer diverted by the effort to make headway either by main force or ingenuity, I could give myself up to the powerful impression of the surrounding nature. Could I impart it to others,—to say nothing of describing in detail its beauties and its glories,—this brief paper would find its justification even with those who have no interest in the minor history of Sir Donald. The splendor of the glittering snow surging upward on the choir of peaks to the southward, or sprinkled amid the aspiring rocks of

Eagle Peak¹ and Sir Donald near at hand, under a sky of deepest blue, and radiant in purest sunlight, was almost bewildering. Everything seemed to be rejoicing in the beauty of that September morning, and it was as if the mingled murmur of the waters near and far were Nature's hymn of joy. It was a place to be alone. But in these respects it was probably like all other high Alpine regions. Solitude here, however, had this added and peculiar charm,—it made it easier to realize that only a brief time before, so brief that it might almost be measured in months, civilized man had known nothing of these glorious scenes. The freshness of the Creation seems to be still upon them; for is it not in great part the fact that the ceaseless succession of generations of human eyes have looked on them, and of human hearts have responded to their message and meaning, that gives to the works of Nature, as well as to man's handiwork, their characteristic of antiquity. The pyramids well may seem in that sense "as old as the hills."

It was just ten o'clock when, crossing the little snow-field visible half way up the left margin of Plate XV., I laid my hand upon the dark ledge, the end of the ridge of rock that reaches out from the base of the high peak of Sir Donald. This is not far from the altitude of the camp where the Swiss had passed the night preceding and that following their conquest; their location was, however, as I understand, some distance to the left. The route they had taken for the summit had led them to the right of this ledge and along by the small glacier partly seen in the picture, then up a couloir in the rock at the right of the great expanse of the almost unbroken wall,—the sole place where, after much previous study, they had concluded that the peak was accessible. But I was not bound for the summit. Turning, therefore, to the left at the ledge, I climbed up over the débris that sweeps around it from that side.

From some cause I now began to experience an unwonted feeling. Was it "mountain sickness," of which so much has been said and written, but concerning which personal experi-

¹ The sharp peak northwest of Sir Donald ascended and so called by Huber; perhaps the Avalanche of Green.

ence at high altitudes had made me somewhat sceptical, except in so far as the mountain may happen to be the place where certain natural causes other than mere altitude work out their effects. The sensation was that of powerlessness, not exhaustion in the sense of weariness, and unaccompanied by anything like nausea — perhaps the feeling of one convalescing from a long attack of fever. Unwilling to yield to it, I kept on in short stages up the rapid slope that the picture shows ending in snow at the base of the rocky face of the peak. (This photograph, however, was taken in July before, and meantime all this snow had melted.) The inexplicable sense of “all-goneness” increased. More frequent rests became necessary, until advances of fifty feet at a time over the easy though somewhat steep slope of fine *débris* exhausted the strength gained at each preceding halt. In these brief rests I diverted myself by watching the descent of little missiles of stones that came skipping down from the great frowning wall above me. The kobolds of the peak seemed to know that I was only in sport, and appeared to be meeting me on that footing. If they had hit me, it would not have hurt.

By eleven o'clock I had crawled up under the inaccessible wall, that nothing quadrupedal even, excepting possibly a lizard, would have ventured a foothold on. The elevation was probably about 7,500 feet, some 3,400 above the Glacier House. Of the nearly 3,000 feet that still rose above me, all that I could see offered no suggestion of rift or crevice. The highest portion visible in Plate XIV., the part above the larger snow patches, was probably invisible from where I was standing.

If I rightly remember, — every circumstance is not wholly clear after three years, — I was glad that all temptation to keep on was thus effectively removed. It only remained to get back to the hotel in time to pack up, get a bit of dinner, and take the train due to leave as the time-table said at “13.15,” that is, in two hours and a quarter. The getting up to where I was had required only an hour more than that. The stunt therefore did not seem difficult, especially as I supposed that on turning to descend my strength would return. To my surprise and no little annoyance, as I did not care to be left, I



MOUNT SIR DONALD.

From the Southwest, across the Illecillewaet Glacier.

Photographed by Emil Huber, S. A. C.

did not find this expectation realized. Frequent rests were still necessary, until I reached a point below the waterfall passed on the way up. From here on I rapidly returned to my normal condition, and on reaching the path was quite restored, so that I swung down it at a good gait and reached the hotel about 12.45.

On comparing times, it appeared that, brisk as the home-stretch had been, I had covered this long mile and a half in but five minutes less than I had taken to make it on the up grade, and to this unwise pace in starting I attribute all the physical discomforts of the excursion. But what were they in comparison with the delights of the most glorious forenoon it was ever my privilege to pass among mountain scenes either at home or abroad!

I value this trip also for the knowledge it gave of the near resources of the Glacier House, and in particular for the conviction it created in my mind that Sir Donald is accessible, to such only as have a right to attempt the ascent at all, in a single day from the hotel. And this may be said without the slightest disparagement of the exploit of Messrs. Huber and Sulzer. If they spent three days at it, it was, first, because they were pioneers seeking out a feasible route, and, again, because they were not in the slightest hurry. Between 7.45 and 11 o'clock I had been able, with an unnecessary *détour* and under unfavorable conditions, to reach a point at about the elevation, though a little less distant, than the place where they took to the steep, snow-filled gully, just below where they encountered their only serious difficulty, — that of getting from the snow slope over a "randkluft" and up a short, but nearly vertical, couloir of rock.¹ From the lower end of the snow-gully they were four hours in reaching the summit, and apparently about the same time in returning to that point; but they were much delayed by a third person, a Canadian porter apparently of little stamina for mountain work and utterly unused to it. To offset possible underestimates add fifty per cent to my time, as representing what would be required to reach this point from the Glacier House and return; then, assuming the time of the Swiss party,

¹ See "*Jahrbuch des Schweizer Alpenclub*," Vol. XXVI, p. 274.

handicapped as stated, as an average time for accomplishing the high peak, and we have a total of fifteen to sixteen hours, which would easily fall within the daylight hours of a June or July day.

Major Curtis Burritt Raymond.

Died,

At New York, at the Victoria Hotel, 22 February, 1893, suddenly,
Major Curtis Burritt Raymond, of Boston, 76 years, 8 months.

FOR nearly forty years each recurring season has found the late Major Curtis Burritt Raymond devoting his best energies to making the eastern side of Mt. Washington more accessible and more attractive to his fellow men. The appended table of distances on his path to Tuckerman's Ravine is his last contribution to our knowledge of the White Mountains.

To those who were so fortunate as to enjoy his friendship, the death of Major Raymond is a keen personal loss; and it is not too much to say that it is a misfortune to every White Mountain tourist. His is indeed a charming memory, of vigorous old age, of courtesy, refinement, liberal education, and all the ennobling characteristics of a gentleman of the old school.

F. B.

Distances on Raymond Path from Mt. Washington Carriage Road to the site of the Snow Arch in Tuckerman's Ravine, measured and counted from the point on the Carriage Road where the path begins, which is about two miles from the Glen House.

	Miles.
Glen View and Glen Ledge	0.6
Moss Brook	
Laughing Rill	
Cascade Brook	1.4
Vesper Falls	1.9
View of Raymond's Cataract on the heights to the right, in crossing its stream by the path	2.1

Junction with the path made by the Appalachian Mountain Club from the Jackson Road and Crystal Cascade to the Raymond Path, where the Appalachian Path ends . . .	2.3
Hermit Lake	2.6
Ravine Stream, upper bank, at crossing	2.9
Francis Blake Spring, — pure and cold	3.1
Site of the Snow Arch in Tuckerman's Ravine, by the Raymond Path, from the Mt. Washington Carriage Road . .	3.4

This is to the foot of the Waterfall (at its right side) where it strikes the rock in the well-defined angle of the precipice at and over the upper edge of every Snow Arch formed in this Ravine, and only a few feet above the two rocks inscribed with large figures in white paint indicating the dates of the finishing of this path to the Snow Arch, "1879," and of clearing it out in "1881."

Measured with a heavy new tape-line for measuring timber, and in the walking tread of the path in order to give the actual distance walked.

From the Glen House to the site of the Snow Arch in Tuckerman's Ravine, adding about two miles of Mt. Washington Carriage Road, the distance is, as measured, 5.4 miles.

CURTIS BURRITT RAYMOND.

Bibliography.

SUPPLEMENTARY APPENDIX TO TRAVELS AMONGST THE GREAT ANDES OF THE EQUATOR. By EDWARD WHYMPER. pp. 26, 147. London, 1891, 8° (Murray).

This is the most important contribution to our knowledge of the animals of high altitudes that has appeared for many years. Travelling with few impedimenta, Whymper used a wise discrimination in collecting with care only at considerable elevations, seldom visited; and though the material brought home embraces some new and many old forms from the lower levels, these are only the incidentals of his sojourn in Ecuador, and have slight interest either for him or us. But, although all the groups collected by him are not yet worked out, this book brings to notice no less than one hundred and sixty species from altitudes exceeding 8,000 feet, of which sixty per cent were previously quite unknown. This number will in time be considerably increased, for the spiders are among the groups as yet unstudied, and Whymper says of them, "I can count up seventy-five species . . . obtained at 9,500 feet and upward."

But it is not the number of new forms that has particular interest for us; it is the special lesson which they teach. If the characteristically alpine genera of beetles and butterflies which, from our knowledge of the alpine faunas of North America and the Old World, and especially from their presence in the Chilian Andes, we should expect

to find in the heights of Ecuador, were not present in these collections, it is almost impossible to believe that they exist there; for these groups were among the best represented among the specimens worked out, and must certainly have embraced therein the mass of the Alpine fauna. The majority of the beetles, says Bates, who writes the natural history introduction, "are mountain representatives of genera characteristic of the lower levels, or the plains of tropical America, some of which genera occur also in other parts of the world; others are American genera, having Chilean or antarctic affinities, whilst others, as far as we at present know, are peculiar to the high Andes." The few butterflies found exclusively at high altitudes (above 10,000 feet), are only three in number, one referred to *Pieris*, two to *Colias*, — cosmopolitan genera, or as Bates says: "All three belonging to small groups of their respective genera, which occur at great altitudes throughout South America, and as far south as Chili. The genera *Erebia*, *Chionobas*, *Parnassius*, *Argynnis*, *Epinephele*, and many others, so highly characteristic of the faunas of the north temperate zone, or Chili, or both, and of high vertical ranges, are quite absent." It seems to Bates a fair deduction from these and similar facts that "no distinct traces of a migration during the lifetime of existing species from north to south, or *vice versa*, along the Andes, have as yet been discovered or are now likely to be discovered." Considering the relationship of the fauna and flora of the Chilean Andes to that of North America, and even of Europe at high altitudes, and of its explanation through the migrations incident to the glacial epoch, this conclusion is not a little startling, and emphasizes the imperative necessity of a thorough examination of the high Andean fauna and flora north and south of Ecuador.

S. H. S.

RECENT HIMALAYAN EXPLORATION. CLIMBING IN THE KARAKORAMS. By W. M. CONWAY. The Alpine Journal. London, August, 1893. Vol. XXI, No. 121. EXPLORATIONS IN THE MUSTAGH MOUNTAINS. W. M. CONWAY. The Geographical Journal, October, 1893. MR. CONWAY'S KARAKORAMS EXPEDITION. "Proceedings of the Royal Geographical Society," November, 1892, and February, 1893.

Serious writers on Hindostan tell us of viceroys and rajahs, of military and civil governments, of races and tribes, temples and religions. Books of the tourist stamp refer to similar topics, and describe rivers and valleys, tigers and jungles, with digressions upon famines and mutinies, and tea, coffee, and rice plantings. If the authors happen to journey toward the great mountain wall that marks the northern limits of the British empire, they usually leave us at some hill station, like Darjiling or Simla, and tell us only of the southern slopes of the Himálayas. Once in a while, from a book like Wilson's "Abode of Snow," we get glimpses of the interior of the ranges. At times, the great Indian story-teller breaks loose from the heat of the plains, from barracks, sepoy, coolies, sahibs, and memsahibs, leaves Hindoos and Mohammedans, theosophy, fifth rounders, tea-cup creeds, and "Sendings," and leads us up "between the tail of a heaven-climbing glacier and a dark birch forest." But these excursions are only for the purpose of showing us hill-men and hill-women, and not the crags and glaciers themselves. So those of us who belong to mountain fraternities turn with delight to the accounts of Mr. Conway's plucky journeys over pass and ice-field.¹

Without referring to the heroic age of exploration in the Himálayas, the work of the Schläginweits, Sir Joseph Hooker, and others, it is well to say a word as to Mr. Graham's experiences in 1883. He was about the only predecessor of Mr. Conway, in

¹ Mr. Conway needs no introduction to mountaineers. His "Zermatt Pocket-Book" is now reckoned among the classics of mountaineering. He gives promise of a forthcoming book on the Himálayas. Readers will find an interesting letter from his pen, describing Kashmir, in "The Nation," Sept. 28, 1893.

that he visited the Himalayas as a mountaineer. Accompanied by Joseph Imboden of St. Niklaus as guide, and later by Emil Dasa and Ulrich Kauffman, he made several high ascents in Sikkim, in close proximity to Mt. Kangchinjanga, crowning all his efforts by the ascent of Kabru (24,000 feet). We note that doubts are expressed that Mr. Graham reached so great an altitude. These doubts seem to be based entirely upon the fact that his party did not experience ill effects from the rarity of the atmosphere. If Kabru is 24,000 feet in height, and its appearance in photographs in the chain with Kangchinjanga would apparently make it out no more than 4,000 feet lower than that great elevation, then Graham certainly reached 24,000 feet, the highest recorded ascent. More than this, he made four other ascents, respectively 19,000, 20,000, 20,200, 21,400, all in the same month (October), and in none of these climbs were the participants affected by low atmospheric pressure. Because members of Mr. Conway's party were seriously affected at 18,000 feet and upward, it does not follow that Mr. Graham's claim is invalid. We note in this connection, that in Dr. Diener's recent expedition to the Central Himalayas, altitudes of 19,000 feet were reached, and one peak was climbed, Kangröbngri (19,170). In this case violent storms that blew from the south seemed to interfere more with the work than did the cold or the rarity of the air. Other things besides mere altitude must help account for mountain sickness, — lung and heart capacity for example.

Mr. Conway's work was principally in the Karakoram or Mustagh Mountains, which range embraces many of the higher Himalayan peaks. K², to which Mr. Conway gives the name "Watch Tower of India," the second highest measured peak on the globe, is in this group. Very little had been known of these mountains. In 1860-1861, Colonel Godwin-Austen made a government map of the southern side of the main range, and in 1887 Captain Younghusband crossed the Mustagh Pass, which was a remarkable feat. Mr. Conway has pushed his explorations into the heart of the range, bringing back much valuable information, making surveys and maps, and taking many photographs. His companions were Lieutenant Bruce, Mr. M'Cormick, an artist, and Mattias Zurbriggen, a Swiss guide. He entered the mountains from the Kashmir side, leaving Srinagar in April, 1892, and returning October 12th. About sixteen ascents were made to points 16,000 feet or upwards.

Zurbriggen rates the Ibx Peak (16,000 feet), one of the mountains climbed, as more difficult than the peaks about Zermatt. Some natives, Gurkhas,¹ also made this climb. Here comes in a new element in Himalayan climbing, the promise that it will be possible to evolve a race of native guides. As an instance of their capacity, these men at high altitudes "took off their boots and climbed some smooth slabs unroped."

Of the valleys, Hunza-Nagyr is one of the most remarkable. The bed of the valley is only about 7,000 feet above the ocean. "Standing in the midst of this area one enjoys an extraordinary view, for both to north and south there rise peaks from 24,000 to 25,500 feet in height." One peak with an unpronounceable name rises near the town of Hunza, and is crowned with hanging glaciers. "Its slope is so steep that an avalanche falling from its summit dusts with snow-spray the houses of the town." From this valley is also viewed the peak Rakipushi, the north front of which presents an appearance similar to that of Monte Rosa from Macugnaga, only showing more than twice the altitude.

The account of the ascent of Pioneer Peak (23,000 ft.) is very graphic. In this climb, the greatest altitude ever attained, with the exception of Mr. Graham's climb of Kabru, was reached. One of the greatest feats was the crossing of the Hispar, a glacier pass eighty miles in length. This is the longest known snow-pass found outside the Arctic regions. The glacier march was a very severe one, passing over moraine

¹ Sepoys from 1st Battalion, 5th Gurkhas.

and *sérac*. Above 18,000 feet the party suffered much from the rarity of the air, but as a compensation the scenery was superb.

We infer from Mr. Conway's descriptions that we must look to the *Himálayas* for the finest scenery in the world. The architecture of the mountains is of the first order. In certain parts, the valleys are but 7,000 feet above the sea, and there one may see unequalled mountain walls and astonishing needles of rock. Surely, from a mountaineer's standpoint, the *Himálayas* offer the most interesting field. Comparing for a moment with the *Alps*, we find there are in Switzerland two peaks a little over 15,000 feet, and but six or seven over 14,000, while in the *Himálayas* there are one thousand, perhaps two thousand, that rise to over 20,000 feet. Then it is probable that a still higher range rises behind this wall, marking the true water-shed far away in *Thibet*.

Some may doubt, but the more experienced probably do not, but that the highest peaks of the globe will some day be vanquished. It is only a question of time, and ability to establish permanent camps above 20,000 feet. Such climbers as Mr. Conway should be given every kind of encouragement. To show his opinion of the noble peaks, however, we quote, "Next, right ahead of us in our march, the still greater and even nobler *Gusherbrum* (over 26,000 ft.) opened upon us, a superb apparition. We were on the look-out for a big peak to ascend, but neither of these¹ seemed to offer the smallest hope of being accessible in any such time as was at our disposal."

Also to give some idea of the magnitude and difficulties of the higher peaks, we quote from Mr. Graham.²

"Next in height [to *K²*], and far excelling in beauty, rises the famous *Nanga Parbat* (26,700), whose flanks are bathed by the *Indus* at an elevation of 3,000 feet only; thus exposing one unbroken slope of nearly 24,000 ft., probably the greatest in the world." Again, "Eastwards across the *Dhaul* River is the *Gurhwal* group, comprising *Dunagiri* and the triple-peaked *Trisuli*, and finally culminating in *Nanda Devi* (25,600), popularly known as the *Indian Matterhorn*. Here the peaks are wild and savage in the extreme, being for the most part bare scarped rocks, too steep for snow to rest on, although so far above the snow-line, and remarkable for the immense number of rocky *aiguilles* and pinnacles, which defy even the *ibex* and the *Himálayan* *chamois*. I do not hesitate to say that the peaks of these two regions, with a few exceptions, present the most awful series of impossibilities that a climber can set eyes on." It is in one of these regions that Mr. Conway made his grand ascent of 23,000 feet, a climb that consumed seven and three quarters hours to rise from 20,000 feet to the summit.

F. H. C.

THE UNITED STATES, WITH AN EXCURSION INTO MEXICO. Handbook for travellers, edited by KARL BAEDEKER. With 17 maps, and 22 plans. Leipzig: Karl Baedeker, Publisher. New York, Charles Scribner's Sons, 1893. Price, \$3.60.

"Oh! wad some power the giftie gie us
To see oursel's as ithers see us!"

We who have seen others so long and so satisfactorily through Baedeker's spectacles, have now the power to see ourselves as Baedeker sees us, and if we have anything to complain of it is not of his scrutiny, but that it has taken him so long to discover us at all. It certainly is somewhat humbling to national pride to think that not until our one hundred and seventeenth year has he considered us worthy his notice. Perhaps the *World's Fair*, which has given us the opportunity of learning more of the nations

¹ See "*Alpine Journal*," August, 1893, p. 419. The other peak referred to was *Maasherbrum* (over 25,000 ft.)

² "*Alpine Journal*," Vol. XII., p. 28.

of the world without leaving our own shores than has ever been possible before, by bringing us more to the notice of other countries, will account for our final "recognition" by Baedeker.

It is pleasant to see the red-covered, fat volume which has been so familiar to us in our travels abroad in the hands of foreign-looking tourists in our own cities and resorts; and, indeed, the first knowledge of the writer that Baedeker had undertaken to guide the world through the United States came in meeting in a quiet Cambridge Street at about sundown of a June evening two French gentlemen, — one with a forefinger between the leaves of the familiar volume, — who asked in delicious broken English, "Ze way to Mont Auburn — where fine view?" Their bewilderment when told that "it" was closed at sundown was comical. "Fine views" in Europe are probably not closed at sundown.

From the standpoint of a member of our Club, Baedeker's United States is to be praised. His scent for fine views entitles him to honorary membership in the Club. He finds them everywhere, even in Hingham Cemetery. Not only does he name them on every page, but the asterisk — "used as a mark of commendation" — is attached to almost every mention of hill or view, and the map of the Environs of Boston gives many hills not usually included in such maps. Possibly this is due to the assistance of officials of our Club, to whom obligations are gracefully expressed, and the Club has frequent mention. Mr. Freeborn's "Climbs in the Adirondacks" is quoted freely and duly credited, and the Club is praised in the White Mountain chapter for "good service in making paths, setting up sign-posts, and preparing maps."

There are fine and comprehensive maps of the White Mountains, of the Adirondacks, and of the Catskills; also of the Yellowstone National Park, the Yosemite Valley, Mount Desert Island, and the Blue Ridge.

The treatment of these mountain resorts seems especially full, accurate, and appreciative. Of the five hundred pages of the book, seven are given to the Catskills, twelve to the White Mountains, fourteen to the Adirondacks, ten to the Yellowstone Park, and eight to the Yosemite Valley; fifty-one pages to these, besides direct or incidental mention of almost every mountain and hill which deserves notice in such a Guide-book. Ascutney is the only omission discovered. Monadnock, "one of the finest mountains in New England," Wachusett, Greylock, and such peaks are adequately described. The Berkshire Hills receive generous attention, and he says, "For the gentle loveliness of a hill-country, as contrasted with a mountain-country, it is unsurpassed in the United States, and has few rivals elsewhere."

"The picturesque Middlesex Fells;" the Blue Hills of Milton; Brookline, "the most beautiful suburb of Boston;" the Arnold Arboretum, "one of the finest institutions of the kind in the world," are noted, but not Arlington Heights. Boston Common is given nearly a page of nonpareil. "Perhaps no other city park in the world is more closely entwined with the historic interests and warm affections of the surrounding population." Indeed, the historic and literary associations of every city and town are admirably stated. Plymouth, Lexington, Concord, Salem, Marblehead, and other historic places are described in detail, and whether one were seeking for views, historic landmarks, literary associations, or for commercial "pointers," he would find this an equally desirable mine of information. Equipped with this guide to the United States the journalistic blunders regarding us, which have been so common in English, not to speak of continental, papers will henceforth be inexcusable. Perhaps the space given to different cities will indicate their relative importance in Baedeker's eyes. Boston and Cambridge have fourteen, New York and Brooklyn fifty, Philadelphia twelve, Chicago — with only the briefest reference to the Fair, as this guide is for a generation, not for Columbian year only — eight, and three each are given to Cincinnati and St. Louis.

The trip to far-off Alaska is not forgotten; and the more one examines the book the

more is he struck with its fulness, its wise discrimination, and its value. While the titlepage announces Karl Baedeker as editor as well as publisher, the preface gives full credit to Mr. James F. Muirhead, a gentleman well known to many of our members as the real compiler; and it shows the practised hand, as well as pains-taking, conscientious care and good judgment, in the selection and arrangement of the matter. Careful inspection fails to find errors, omissions, or blunders worth speaking of, and the tourist at home as well as the traveller from abroad will find the book indispensable.

A. S. P.

CHECK-LIST OF THE PLANTS OF GRAY'S MANUAL. JOHN A. ALLEN. Herbarium of Harvard University, Cambridge, Mass., May, 1898.

This little pamphlet of one hundred and thirty pages, corresponding to the sixth edition of the Manual, is printed in large type, with good margins. In an Appendix of eight pages will be found the names of many plants discovered since the sixth edition of the Manual was published. If any members of the Appalachian Mountain Club have plants undescribed in the Manual, whether mentioned in this Appendix or not, they are requested to send specimens to the Harvard Herbarium. As this book is only $7 \times 4\frac{1}{2}$ inches, it can easily be taken in the pocket on a tramp through the mountains, and doubtless many members of the Club will find it useful.

Thanks to a friend of botanical study, "copies will be supplied, postpaid, from the Herbarium of Harvard University, Cambridge, Mass., at the following rates:—

"Bound in paper, 10 cents apiece; three for 25 cents; five for 40 cents; ten for 75 cents. Bound in leatherette, 25 cents apiece; three for 60 cents; six for a dollar."

W. H. S.

DER BERGSTEIGER IM HOCHGEBIRGE.—Alpin-Touristische Schilderungen nach den Berichten hervorragender Hochtouristen. Zusammengestellt und erläutert von Julius Meurer, Präsident des Österr.-Touristenclubs, und Joseph Rabl, Redacteur des Österr.-Touristen-Zeitung. Mit 33 Abbildungen. Wien, Pest, Leipzig. A. Hartleben's Verlag. Pages 264, large 8vo.

The authors of this remarkable compilation start from the postulate that the desire to climb to Alpine heights and to confront their dangers is based upon something constant in human nature, and hence is destined to continue; accordingly, it is wise and necessary to give proper instruction in the art of climbing, both for the furtherance of a noble form of sport and in order to forestall the attendant dangers, so far as they may arise from ignorance. In carrying out their programme the plan is adopted of joining precept with illustration; that is to say, descriptions of the ground and conditions, with citations from the recorded experience of the most celebrated climbers. So completely is the programme executed that "Der Bergsteiger" becomes a regular compendium, or digest, of the science of Alpinism, if we may so term it. The abundant citations are from special works in part, but largely culled from Alpine periodicals, — a form of literature of very recent birth at best, but which has taken an enormous extension within a decade and a half. Though men of nearly every European nationality have contributed to its mass, our authors content themselves with quoting almost entirely from German, Swiss, and English writers. Among those who have written in German, Zsigmondy, Güssfeldt, Barth, Hess, Studer, and Lammer are most often cited; among Englishmen, of course Whymper, Tyndall, Tuckett, and Leslie Stephen. With such an array of authorities the collators well might be content.

With that love of method which is so characteristic of the German mind, the work has its divisions and subdivisions, and first into three main sections: On the Crags; On

Glacier and Snow-field; and, thirdly, a miscellaneous section, wherein we find treated Guides, Tours without Guides, Tours by Oneself, Nights at High Altitudes, Fogs, Tempest, Gale, and Cold, and a discussion of the various physical ills that may beset the climber. A very complete index ends the volume, which, moreover, is interspersed with excellent illustrations made, not merely to decorate, but to *illustrate*.

Part I. is now subdivided. After a brief statement of the nature of the cragman's work in general, and a detailed description of his implements, with citations as to their utility and value, the second subdivision, "Auf der Tour" (pp. 17-83) takes up the description, likewise in detail, of the different qualities of ground to be traversed, — vertical cliffs, shaky rock and rolling stones, smooth ledge, ledge under ice or snow, "chimneys," rock avalanches, couloirs, narrow shelves, sidewise motion along rock-faces (traversing), arêtes, snow-cornices, the descent of steep cliffs and snowy slopes. Discussions of snow, however, are here episodic and subordinated. Of the above categories, rock avalanches and arêtes are most extensively treated; the former doubtless because of the necessity of dwelling upon a chief source of danger, the latter because they afford the maximum of satisfaction, or the reverse, to those engaged in climbing along them. The editors impartially present quotations from the lovers and contempters of arête travelling; thus Löwl, Güssfeldt, and Hess express their delight when on these rocky knife-edges, while Whymper, "who thinks only of attaining the summit, has nothing favorable to say of them." Numerous citations follow, describing some of the most notable instances of such climbing; as, for example, Whymper's descent of the southwestern arête of the Matterhorn.

The climax of interest is attained in Part II. (pp. 84-217) inasmuch as excursions on glacier and snow-field present the maximum of danger and difficulty. The method of treatment is the same as in Part I.; indeed, in some parts is a repetition. Besides the topics treated there, however, we now have the discussion of ice-fall, crevasse and schrund, snow-covered glaciers, the névé, avalanches, and snow cornices, and the citations become more thrilling. Indeed, the entire book is calculated to fill one with an unwonted respect for the mountain, almost to the point of frightening away from it. If it falls into the hands of those who need this régime, well and good; it will thus fulfil one of its most serious purposes.

The discussions of the third part indicate clearly the position of the authors on the side of caution. Thus, under the head of "Tours Alone," while quoting from enthusiasts who think that thus only does one derive the highest pleasure and the best discipline of courage, it is evident that they side with those who regard the custom as over-hazardous. The discussion of mountain-sickness is less full and up to date than that mentioned below in the review of the *Jahrbuch des S. A. C.*

It remains to add that two books of similar intent, but differing in method of presentation, have recently appeared in English, one of which, Dent's *Mountaineering*, is in our Club library.

C. E. F.

JAHRBUCH DES SCHWEIZER ALPENCLUB. Siebenundzwanzigster Jahrgang, 1891 bis 1892. Bern. Verlag der Expedition des Jahrbuches des S. A. C. 1892. (Pp. ix., 512. Illustrations in text, 24; in portfolio, 1 map, 3 panoramas.)

With its twenty-sixth annual issue the *Jahrbuch* of the Swiss Alpine Club underwent a change of form to full octavo size, and with this an increase of elegance that places it at the very head of the Alpine publications of the world in all that goes to make up an exquisite volume. The letterpress is perfection itself; the illustrations, at least the heliotypes, we have never seen surpassed for firmness of outline, clearness of finish and detail. This is notably true of the frontispiece of the present volume, the *Aiguille de la Za* from its base, from a negative of Vittorio Sella, — a picture that is

familiar to our members as one of the most striking (No. 272) among those recently exhibited by the Club in Boston.

The scheme of the magazine divides its contents into five sections: The Club Domain; Outside Excursions; Dissertations; Minor Communications; Reports and Proceedings for the year. Of these rubrics the first calls to our attention a peculiar feature of the S. A. C., in that it apportions from time to time some circumscribed section of Switzerland for detailed study, thus securing in process of time a thorough and exhaustive knowledge of the topography and natural history of their entire country. The Rhätikon and Hochwangkette is the portion under consideration since 1890. Three articles are found in this section, of which two, by A. Ludwig and E. Imhof, are supplementary to papers that appeared in the preceding volumes. Under "Free Excursions" no trips are this year presented which carried their makers beyond the confines of Europe. "Climbs in the Pennine Alps" are described by G. Ewinger. A. von Redewaky discusses "The High Peaks of Bergell," while a lady, Hermine Tauscher-Geduly, an honorary member of the S. A. C., writes of her ascents from the Forno Hut. Th. Boul furnishes a paper on "The Pusterthal and the Dolomites of Southern Tyrol." Especially interesting will be found an article communicated by A. Wäber, entitled, "On Foot through the Valleys of Upper Piedmont in 1829," — in days a generation earlier than the invention of Alpine Clubs.

For American readers, however, the articles gathered under the rubric "Dissertations" (Abhandlungen) will possess the greatest interest. The first of these is a discussion of an original panorama of the Unterwalden and Bernese Alps, — a recently discovered document dating from 1754. The maker "aimed at accuracy," but working at arm's length and by rule of thumb, he can hardly be said to have attained his object. The average error in twenty-three peaks is an excess of about 4,300 feet! His scheme of operation is set forth in detail, if our topographers are interested to examine it.

Another contribution by Mr. Wäber discusses a pass alleged to have existed in ancient times between Grindelwald and Fiesch. Basing his argument on the improbability of adequate geological changes within the historic period and the weakness of existing documentary testimony, he finds nothing left to stand upon save oral tradition. In this he allows there may be a possible basis of fact, in that it is not improbable that a few individuals may have crossed the *arête* where a practicable *pass* was out of the question. — Pastor L. Hurner, under the enigmatical title "An Edelweiss Find," — explained by the symbolic meaning of the edelweiss, which typifies all high and noble things, — writes a biographical fantasy upon a most interesting character, a cow-herd poet and philosopher of the Stocken Alp, one "Father J. B." Admirers of a gentler and humbler Thoreau would enjoy this paper greatly. — Cold science follows upon this sympathetic flight, an article — the twelfth annual report — on "Periodic Variations of Alpine Glaciers," by Prof. Dr. F. A. Forel, from which it appears that all the glaciers of Mont Blanc and of the Valois and some of those in the Bernese Oberland — fifty-four in all — were increasing in 1891, while those in Eastern Switzerland were all decreasing. Professor Forel has made four maps representing states of growth in 1875, 1880, 1885, and 1890. — Dr. Egli-Sinclair, who acted as physician and physiological investigator with the Imfeld Expedition, that spent ten days near the summit of Mt. Blanc in 1891, writes most interestingly and convincingly, so far as he goes, upon "Mountain Sickness." The history of the matter from Saussure down is presented, and among the sufferers who believe in the actuality of the malady and have testified thereto we find such authoritative names as Tyndall, Tuckett, Kennedy, Grove, and Russel.

Dr. Sinclair entered upon his investigations as a doubter. The experience of the Imfeld party was certainly calculated to convince the most sceptical. For ten days, now more now less, the whole party seems to have been under the malign influence of — what? Thanks to Dr. Sinclair's microscopic examination of the blood corpuscles of

his companions and his own, a plausible and, as he states it, a sole incontrovertible cause can now be alleged. The explanation is on chemical grounds, — the under-oxidization of the blood through lack of pressure, a theory suggested by Dr. Jourdanet in 1861, and now supported by experimental observation. Mountain sickness is *anoxemia*. Experiment showed in a vigorous young member of the party a slight diminution — from 101 to 92 — of hemoglobine (red matter); in a somewhat older man, Imfeld himself, from 98 to 68; in the author, from 86 to 54, in the same days. One question would still seem to require an answer, — How comes it that Graham could reach 24,000 feet in the *Himálayas* without discomfort?

Mountain climbers who read Mr. J. H. Brown's article on "The Fear of Death," in the *Forum* in 1890, will find most interesting and very comforting the treatise that closes this section, — "Notes concerning Death by Falls from Great Heights," by Dr. Albert Heim, an answer to the question, What are the sensations of the victims of these disasters in the last seconds of their life? Dr. Heim speaks from experience, having as good as died once in this way, striking upon the rocks after a swift descent down a snow couloir, and a final drop of nearly seventy feet. As he remained deprived of consciousness for half an hour, and it was probably a question whether he was likely to regain it, we may allow him to speak as an expert in this mode of leaving life. He cites, however, from other similar authorities. One leading object of the author in putting this testimony on record is to bring comfort to such as have lost near friends by disasters on the high peaks. It is almost to be feared that he may have overreached his mark, for he so dwells upon the delights of the experience, — no pain, no fear, no dread, being wafted on rose-colored, and particularly upon delicate violet, clouds, while "eine göttliche Ruhe zog wie herrliche Musik durch seine Seele," — that he seems to put a premium upon seeking this "schönen Tod." The article is exceedingly interesting, and he who here reviews it could bear witness to the truthfulness of some of its data. Of the Minor Communications, the most interesting to us are upon the "Soundings for Rock on the summit of Mont Blanc in 1891," and "The Topography of Palestine," with an exquisite little reduction of the Leutzinguer map. From the Annual Report we learn that the S. A. C. numbers 3,610 members, in 37 sections, with property amounting to about \$7,700. Many other interesting facts concerning its great activity we must omit to mention for lack of space.

C. E. F.

ANNUAIRE DU CLUB ALPIN FRANÇAIS. Dix-neuvième Année, 1892.
Paris, 1893.

The abundant activity of this most energetic Association is well attested by the size of the present volume, and by the wide range and importance of the topics treated. In opening the volume one naturally looks to see what has been done in the neighborhood of the King of the Alps, all of whose peaks and arêtes have long ago been fully examined and described. The place of honor is held by an article by Messrs. Henri and Joseph Vallot, entitled "Note sur la Carte du Massif du Mont-Blanc à l'échelle du 20,000^e, et Etude des Aiguilles-Rouges." The best map at present available is that prepared by Captain Mieulet, of the French army, in 1863, on a scale of 1:40,000. This map, admirable as it is for its ample scale and beauty of construction, contains not only sundry typographical errors, but some few faults in location of points. The new work is in various stages of completion in its different parts, but the triangulation of the Aiguilles-Rouges is so far advanced that the authors have published with their article a map to show the difference between the locations assigned on Mieulet's map and on their own.

Later on, under the heading *Sciences et Arts* is found a short article by the venerable but very active honorary president of the Club, M. Jules Janssen, describing the progress of the work on his observatory to be erected on the summit of Mont Blanc.

Attempts made a year ago to find the summit rock under the snow were unsuccessful, and as experiments made at Paris have proved that the hardened snow is quite firm enough to sustain the weight of the proposed building, he has given up the intention of finding a rock foundation for it. It will be shaped like a truncated pyramid, about thirty-two by sixteen feet in dimensions at the base. The lower story will be set in an excavation below the surface of the snow for additional protection against wind and cold. In preparation for this work he has had built a second chalet at the Grands-Mulets and a refuge-hut at the Rocher-Rouge, about 1,200 feet below the top of the mountain. Part of the materials for the observatory have been transported to these huts, and it is hoped that another summer will see the work completed.

Those who have travelled from Geneva to Chamonix by diligence or *berline* will remember the very narrow defile with its pretty park and its big bathing-establishments and hotel at St. Gervais-les-Bains, where they dined on the way up. On the night of July 11-12, 1892, a fearful avalanche of water, ice and mud swept through that defile and did enormous damage to life and property. The cause of the flood was something hitherto unknown in the history of such accidents. Seven thousand feet above, and fifteen miles away, a wide, deep pit had, in some as yet inexplicable manner, been formed in the surface of the glacier of Tête-Rousse. This cavity had become filled with water by the stoppage of the discharging crevices at the bottom, the front wall had given way, and the whole mass of water had rushed down the steep gully into the valley, carrying everything before it. In "La Catastrophe de St. Gervais" M. Charles Durier, the able and active vice-president of the Club, has presented a monograph with illustrations to show the cause and extent of the disaster.

M. M. H. Ferrand contributes a paper on "Le Massif du Rutor," which lies just south of the Little St. Bernard Pass between Italy and the Tarentaise in Savoy. This is his fifth paper, in successive numbers of the "Annuaire," on this chain of the Alps. Besides a general account of his excursions in that section, he describes an ascent of the peak of the Rutor from the French side, which he claims as the first made from that direction.

The same corner of France is also noticed in an article by M. H. Dulong de Rosnay, entitled "Première Ascension du Pic Central ou Grand Pic d'Argentière." This peak is one of a chain of singularly sharp, steep summits lying ten or fifteen miles east of Grenoble. The difficulty of ascent arises, not so much from the great height of the mountain, as it has much loftier neighbors which have often been climbed, such as the Pic de Belladonne and the Grandes Rousses, but mainly from its steepness and the smoothness of its rock-faces. Doubtless also the difficulty of determining which of the many sharp, closely-packed peaks was the highest may be a sufficient reason why the first ascent of the highest peak was not sooner accomplished, for peaks of equal difficulty near by had already been scaled. A curious illustration of this sort of error is noted by the writer of another paper, namely, that two neighboring peaks are called Pointe du Grand and Pointe du Petit, from their apparent height when seen from an adjacent village, a naming which proves on measurement to be just the reverse of descriptive.

Dauphiné furnishes material for still another article full of enthusiasm, not only for climbing, but for the appreciation of the grand and beautiful scenes offered to those who cultivate this sport. M. H. Granjon de Lépiney, a naval officer, describes in "Les Cols du Pavé et de la Pilatte" a two days' tramp from north to south over the massif of Pelvoux. The first day he went from the upper end of the valley of the Romanche over the southern ridge of La Meije to La Bérarde, in the valley of the Vénéon. The following day he crossed the Col de la Pilatte, over the southern spur of Les Écrins. The former of these passes is so rarely used and so little appreciated that no description of it had previously been published, but according to the author of the article, it is richest in grand views of all those that surround La Meije.

M. Maurice Gargon describes his "Première Ascension du Grand-Bec de Pralognan,"

directly in the centre of the Tarentaise. The priority of ascent, however, refers only to the west side of the mountain; it is usually approached from the east. From the west it appears at the head of the valley "with its face like the façade of an enormous cathedral, one of the most decorative summits one could wish to see."

The southwestern corner of Savoy supplies the theme for a most valuable and delightfully readable monograph on "Les Bauges," by M. Georges Bartoli. The general aspect, the geology, the orography, are first discussed, then the notches and passes are described. A section of the paper is devoted to the central tourist town of the district, Châtelard; and then follow minute and valuable descriptions of three notable ascents to be made from that village. He remarks that the inn at Châtelard is called *Hôtel de l'Harmonie*. "And don't imagine that this is by any means a misleading title; for the master of the house scrapes the violin, one of his sons cultivates the cornet, and another 'pumps' the trombone; so that symphony, at any rate, if not harmony, is always on tap at that house."

Two other articles, "Les Pointes du Bouchet," by M. P. Lory, and "Autour du Villard de Lans," by M. J. Delmas, are not the least interesting of the Dauphiné literature of this volume. The first has to do with the southeast corner of the Tarentaise, and the second describes in detail an ascent of La Moucherolle, a mountain a few miles southwest of Grenoble, but little visited by tourists, though an excellent view-point of moderate elevation and difficulty.

The southeast corner of France furnishes material for still another article, "Excursions dans la Région Nord-Est du Département des Alpes-Maritimes." The author, M. Edouard Dujardin Beaumetz, was attached as assistant-surgeon to a battalion of militia doing camp duty in that country in the summer of 1892. His duties led him to traverse in all directions the picturesque valleys and passes of the region lying between the Maritime Alps, northeast of Nice, and the Mediterranean.

Switzerland is represented in this Annual by only two contributions, "Quelques Jours en Suisse" by M. Alphonse Chambrelent, and "Du Grimsel à Fiesch par le Col de l'Oberaar et la Concordia-Hütte," by M. P. Guinet. The few days of the former are devoted to the ascent of the Eiger, the Grande Dent de Veisivi, the Aiguilles des Doves-Blanches, the Pigne d'Arolla, and Mont Brulé. The author opens and closes his account with remarks on Alpinism in general, and ends with these words, so well appreciated by all who have found pleasure in mountaineering: "And when by your own strength alone you have reached the lofty point proposed, you feel all the pleasure arising from the consciousness of having surmounted a great difficulty; you have a wider horizon to your soul, a vaster career to your ambition, and you return to life's struggle with greater vigor and increased confidence."

If any one has not yet heard of the Dolomites, let him read M. Henry Babeau's article entitled "Le Val d'Ampezzo dans les Dolomites," and he will find in the writer's experiences an enthusiasm worthy of the subject, and a subject worthy of his enthusiasm, which cannot fail to kindle his own interest to know more and see something of that wonderful group of mountains. "The beauty of Cortina" (in the Val d'Ampezzo), he says "and in general of all the region of the Dolomites, is the variety and gracefulness of the peaks. As you enter the valley, there at the end is a mountain which recalls the towers of Notre-Dame; nearer, in the southeast, is the graceful, white summit of Antelao, which bears some resemblance to the Matterhorn; in the west the strange Cinque Torre rise against the blue sky like the five fingers of the hand of some monstrous giant." "Cortina d'Ampezzo is a charming place for those who love the mountains for their own sake, and do not look for grand hotels with porters sporting more gold cord than ambassadors, and prices rivaling in height the surrounding summits."

M. L. Richard, under the title "Excursion Scolaire dans les Vosges et le Jura," contributes an interesting account of the tour of a party of twelve students and two

professors through the mountains named. In closing, he speaks of the advantages of such tours, and adds on a kindred subject: "I have just spoken of our Sunday outings; previous to this year (1892), these were of rare occurrence, and were confined to a single school; now nearly all the *lycées*, colleges, and secondary schools of Paris take part in them. On All-Saints' day, in hideous weather, an excursion to Compiègne and Pierrefonds brought together forty-two participants; another to Grignan and Mariy, on a day of alternate snow and rain, in the middle of December, attracted fifty-nine. These results show us that the young people of to-day are not so effeminate as some people seem to think." It may be of interest to Appalachians to know that these Sunday outings near Paris cost from twenty-three to ninety-five cents a head, and an eight-day tour of the Vosges and Jura, like that described, cost six dollars a person.

"Quatorze Jours dans le Sahara Algérienne de Biskra à Biskra par Tougourt et El-Oued," by M. Edouard Rochat, and "Une Oasis Saharienne en Espagne," by M. Victor Riston, present scenes quite different from those thus far noticed, though none the less picturesque. The oasis in Spain is, of course, that around the town of Elche, on the warm eastern coast of that country, a town so different in general aspect from its neighbors that it has won for itself the name of "Little Jerusalem." M. le Docteur Bidé describes an "Excursion à la Sierra Nevada et Ascension du Picacho de la Veleta." This peak, the highest in Spain, over 11,000 feet, rises a good day's journey southeast of Grenada, from which place the author and his companions make their start. A map and panorama accompany the article.

"Aperçu de la Forme et du Relief des Pyrénées" is the title of an article by Messrs. F. Schrader and Em. de Margerie, designed to accompany and explain an excellent map of the whole range of the Pyrenees. The map is very clear, with colors and hatching to indicate the contours, and is not loaded with unnecessary lines or letters. It is on a scale of about twelve miles to the inch.

If any one is curious to see what can be done by an enthusiastic mountaineer of sixty-six years, let him read the "Nouvelle Visite au Malibierne" by M. Charles Packe. The peak and valley of this name lie on the Spanish side of the Pyrenees, near Monte Maudits in the middle of the range. He notes that the first known ascent of the Pic de Malibierne was made by him in 1865.

The route of M. L. de Launay, described in his "De Cetinje à Nijni-Novgorod par la Bosnie et la Transylvanie," leads him through scenery of the most varied character, the sometimes rocky, sometimes pine-clad mountains of Montenegro, Bosnia, and Servia, the broad plains of Hungary, the forest-covered mountains of Transylvania, the melancholy, monotonous steppes of Ukraine, and the flat, timbered country of Central Russia.

M. Ed. Sauvage, in his sketch "Excursion à Jérusalem et au Caire," gives a running account of a short visit to Jerusalem and Jericho, Port-Saïd, and the northern half of the Suez Canal, Cairo, and the pyramids. His visit was made in connection with the opening of the new railway, about fifty-six miles long, from Jaffa to Jerusalem, and, aside from this work, there appears nothing new to note in the country or in his account of it.

What would the "Annuaire" be without the familiar "Sous Terre" of M. Edouard Alfred Martel, who counts among his many marks of appreciation a Corresponding Membership in the Appalachian Mountain Club, and his cousin, and most active co-adjutor, M. G. Ganpillat? For the fifth year this title greets us in these pages, and we recognize the interesting explorations, the graceful and forceful language, and the minute and graphic plans of these tireless divers after the hidden beauties and wonders of the underworld. The most interesting part of this year's article, to the general reader, will be that relating to the famed fountain of Vaucluse, the mystery of whose origin they vainly tried to solve. In reviewing the results of their work they say:

"For our part, we have the satisfaction of having carried out, in the main, at least, the programme which we drew up in 1888, and of having increased the general knowledge of the principal pits and caves, previously unknown, in the limestone plateaus of the south of France, of Vaucluse, and of la Charente. Many points, of course, remain to examine, many questions to elucidate; but the hundred pits, the fifty grottoes and caves, and the twenty-one miles of galleries thus far explored, enable us to arrive at some general conclusions in regard to underground geography. Our success will perhaps incite our imitators to explore the caves of the Jura, the Alps, the Cevennes, and the Pyrenees for the important secrets which they still hold concealed."

From the Annual Report of the Executive Committee, it appears that the Club now numbers thirty-nine sections, two new ones, Albutville with seventy-two members, and Cantal with twenty-eight, having been admitted during the past year. The whole number of members on June 20, 1893, was 5,380. F. W. F.

BIBLIOGRAPHICAL NOTES.

It is pleasant to see from these records that across the water, as with us, mountaineering zeal and scientific research do not exclude good fellowship and joviality upon occasion. We remark also that interested audiences gather everywhere to listen to the recitals of discoveries made, and perils or hardships encountered by excursionists.

In one respect our foreign brethren show laudable public spirit, and set us a good example. In the Report of the "Club Alpin Français" for January, 1893, there is an account of journeys and excursions organized by the Paris section for the boys in the public schools. In the year 1892-93 upwards of eighteen pupils at a time, never more than twenty-five at once, were taken to Normandy, the Vaudois Jura, the Vosges, and the Neuchâtelese Jura, under the auspices of the "Club Alpin Français." During that time there were also fifteen short excursions in the environs of Paris, one hundred and ten boys going on one occasion. No sickness nor discouraging accident occurred in consequence, though the weather was wintry and often proved tempestuous. Teachers accompany these parties, one for each school represented, and the pupils are divided in sections led by one of their own number, each section designated by a ribbon of different color in the buttonhole. These walks have taken place on Sunday hitherto, and every boy who goes must be presented to the committee in charge by a member of the Club, or else recommended by his teachers.

The Paris section also invites men of mark to address them from time to time, and in the February Bulletin there is an interesting account of the address made by M. Monnier in the rooms of the Geographical Society, Boulevard Saint Germain. M. Monnier was the travelling companion of the gallant young explorer Captain Binger, whose peaceful missions in darkest Africa are worthy of all praise. This time, in the company of M. Monnier, he crossed the forest zone to the high Soudanian plateau, visiting the commercial centres of that region, the large towns of Kong and Bondoukon. After leaving Kong they traversed in peace and quietness regions till then untrod by white men. M. Monnier describes the great waving fields of corn and the extensive yam plantations, which they saw every day, watched by children who were paid three ears of corn a day for keeping off monkeys. In the villages — remarkably clean for Africa — they were hospitably received and entertained by the friendly inhabitants, whose unrestrained curiosity, however, was sometimes intrusive and annoying. In this journey two distinct types were marked by the explorer, — the Guinea negroes living in the woods, idle, superstitious, lying, and cowardly; and the Mande-Dioula of the plateau, who are active and industrious, living by trade and agriculture, devout, but not intolerant, Mahometans, — a great contrast to their degraded, superstitious neighbors.

In February the Paris section, also at the rooms of the Geographical Society, listened to M. Vallot's lecture on Subterranean Photography. Pictures were exhibited taken by the newly-discovered flash-light, equally available, it seems, in interiors where the ordinary light of day is not always satisfactory. There was also an illustrated account of a walk through the Paris catacombs.

The "Echo des Alpes" of April, 1893, contains an interesting description of the genesis of the panorama of the Bernese Alps exhibited in Chicago, and there is also in this number of the "Echo" a contribution by a guide from Salvan, Pierre Délez, a description of his ascent of the "Clocher de Luisin," — a harebrained gymnastic feat apparently.

The Mont Blanc section gives the following information in regard to guides' diplomas. According to the latest regulations all candidates must be of age, and are obliged to show a certificate stating that they have made, in the company of a regularly commissioned guide, three important ascents, — one of Mont Blanc and the two others of mountains at least 3,000 metres in height. They must also produce credentials of respectability and good conduct with an attested declaration that they have always been law-abiding citizens, in addition to their medical certificate. Old guides go on the list. As the result of this decree you are free to choose your own guide, instead of taking them as before, when their turn came.

In the "Alpine Journal" of February, 1893, Mr. Walker deplores the constantly-increasing number of refugees. He thinks that they constitute a real danger by encouraging perilous expeditions which they seem to render practicable to the uninitiated.

The Swiss publication from which we have already quoted, "L'Echo des Alpes," is certainly well edited and interesting. In the "Notes Diverses" we find an explanation by M. Albert Brun, of the Mont Iseran mystery. That giant of the Graian Alps, whose place is indicated on all the military maps of Piedmont, ancient and modern, had never, so far as was known, been seen by any one in the memory of man. You went where it was or where it was said to be, and it was not to be found.

The name, however, lately appeared in a list of individual ascents made by M. Albert Brun, who communicates the following statement in answer to inquiries : —

"Mount Iseran is a pass 2,484 metres in height between the upper valleys of the Arc and the Isère, time out of mind a strategical road of communication running parallel to the Franco-Italian frontier. In the days of Francis the First and Prince Eugene it was constantly traversed by armies, and for that reason it is always indicated on old military maps. The prominence accorded to lofty peaks is a comparatively new departure in cartography, and the word 'Mount' was formerly used by geographers, as it is in Germany and Switzerland to-day, to designate elevated regions, generally upland pastures or such passes as that of Mont Cenis, for instance, where no one looks for an alpine peak. It is exactly the same thing in relation to Mont Iseran."

So the great mountain ghost is laid at last, and we shall probably hear no more of the lofty head, reared against the clouds, that vanished on a nearer approach, like Sir Walter Scott's fortress-castle of the Valley of St. John.

M. E. M.

Proceedings of the Club.

February 27, 1893. — Special Meeting.

President Fay in the chair.

One hundred and seventy-five persons were present.

Dr. C. Willard Hayes of the United States Geological Survey gave an illustrated lecture, "Through Alaska with Lieutenant Schwatka; an account of exploration in the Yukon Basin in 1891, and the first crossing of the St. Elias-Wrangell range." The party crossed the range by the pass at the head of the Taku Inlet, proceeded in a canoe down the river to Fort Selkirk, crossed the country, and then without guides or packmen, and suffering great privations, passed over the Divide again to a branch of the Copper River. This they descended in a boat which they constructed. Three months were consumed in the journey from Juneau to Sitka. The party consisted of Lieutenant Schwatka, Dr. Hayes, and Professor I. C. Russell.

The lecture was exceedingly interesting, and was illustrated by sixty lantern slides.

March 8, 1893. — One Hundred and thirty-sixth Corporate Meeting.

President Fay in the chair.

Seventy-five persons were present.

The first paper presented was entitled, "The Land of the Causses: The Caves of Bramabiau, Dargilan, Padirac, etc.," by M. Edouard A. Martel of Paris, translated and read by Frank W. Freeborn. (See p. 130.) The first part of the paper, dealing with the region above ground, is published in *Appalachia*, Vol. vii. pp. 18-30. This interesting region is in southern central France, and was unknown until called to public attention by Mr. Martel.

Mr. Philip Stanley Abbot gave a detailed description of his ascent of the Weisshorn last summer. The difficulties and dangers of the peak were explained, and the magnificent Alpine scenery was illustrated by a dozen lantern views. (See p. 108.)

April 11, 1893. — One Hundred and Thirty-seventh Corporate Meeting.

President Fay in the chair.

Ninety-five persons were present.

Rev. Ernest C. Smith gave an account of "A Week's Explorations on Mt. Rainier." The mountain, the grandest in the United States outside

of Alaska, was studied in various aspects and on all sides. Many trips were taken upon its glaciers, and a night spent upon the summit. The great interest of the account was enhanced by stereopticon illustrations. The paper will probably appear in *APPALACHIA* vii. 4.

April 29, 1893. — Special Meeting.

President Fay in the chair.

One hundred and eight persons were present.

Mr. Charles M. Skinner, of the Geographical Section of the Brooklyn Institute, gave a lecture, profusely illustrated with the stereopticon, entitled, "Across British America." After showing a few views of Montreal, Winnipeg, and the Great Plains, the lecturer took the audience to Banff and the fine peaks of the Canadian Rockies. Excellent views were shown of Sir Donald and the glaciers of the Selkirk Mountains. A few views of the Yellowstone Park were inserted, and the lecture closed with pictures of the Columbia and Fraser Rivers, Vancouver and Victoria, and Mount Baker.

May 3, 1893. — One Hundred and Thirty-eighth Corporate Meeting.

President Fay in the chair.

Thirty-eight persons were present.

Rev. Lemuel C. Barnes presented a paper entitled "Mt. Hermon in April." A brief description was given of the mountains of Palestine, from Abraham's Hill in the south to Mt. Hermon, with Jebel es Sheik, "Mountain of the Chief," in the north. Great difficulty was encountered in persuading the native guides to undertake the ascent, but the snow was found in good condition and the feat accomplished. An excellent description was given of the grand and exceedingly interesting view from the summit, 9100 feet above the sea. The ascent was made from Hasbeya on the west side, and the descent to camp on the north side. It was a long, hard, but memorable trip, made on Good Friday, April 15, 1892.

Mr. F. W. Freeborn described his trip over the pass on the east side of Mt. Hermon in a March storm more than twenty years ago, and Mr. R. B. Lawrence mentioned a similar experience April 22, 1892.

Mr. Charles C. Hall presented a paper entitled "The Shawangunk Mountains." A description was given of the range, the beautiful lakes, Mohunk and Minnewaska, the cliffs, and numerous falls. Many charming paths help to make this picturesque region very delightful for a summer vacation.

Professor Niles alluded to the interesting geological features of the range, and Professor Fay called attention to the wide interest of the club, as shown in the two papers of the afternoon, combining the near and the remote, the beautiful and grand in Nature.

Having invited the Corresponding Secretary to the chair, the President then offered the following motion: —

"That the Appalachian Mountain Club recommend to the citizens of Tamworth and Ossipee, N. H., and to the United States Geological Survey, the adoption of the following names for portions of the so-called Ossipee range lying in said towns, to wit: —

"1. Mt. Whittier for the portion so named on the map of the New Hampshire State Geological Survey.

"2. Mt. Larcom for the minor peak at the north-western corner of the range, originally called Mt. Whittier by Mr. Sweetser in the White Mountain guide-book.

"3. Bearcamp Mountain for the subordinate north and south range opposite to Bearcamp station, known in the guide-book (Ticknor's) by the ambiguous name of 'The Ossipee Mountain,' and variously called 'Mt. Whittier,' 'Rattlesnake,' and doubtless other names by residents and tourists."

An amendment suggested in a letter from Mr. J. R. Edmonds, Councilor of Topography, that the word "adoption" be changed to "use," was offered, which was accepted by the mover of the motion.

Remarks were made by Messrs. Fay, Niles, and Lawrence, and the motion as amended was passed unanimously.

May 19, 1893. — Special Meeting. Gallery of the Boston Art Club.

President Fay in the chair.

After an hour spent in social intercourse and the examination of the Sella Collection of mountain photographs, the meeting was called to order, two hundred members and friends being present.

Professor William H. Niles spoke of the scientific significance of the collection. Good photographs possess a great value in teaching science, and as a means of mental development.

Mr. Wilfred French, who, during eighteen years, has often served as a judge at competitive exhibitions of photographs, said that this was the finest collection he had seen. He mentioned particularly the wonderful atmospheric effects, and the light and shade on the snow. One of the views of Ushba in the Caucasus he considered the finest of the collection, one of Sas Maor in the Tyrol the most artistic, and the various panoramas remarkably successful.

June 14, 1893. — One Hundred and Thirty-ninth Corporate Meeting.

President Fay in the chair.

Thirty-five persons were present.

The President mentioned the success of the exhibition of Sella photographs, and of the subscription to purchase the collection for the Club.

A paper by Miss Lucy A. Putnam, "An ascent of Adam's Peak, Ceylon," was read by Miss M. A. J. Frothingham. The writer described

the mountain and the path, the Holy Footstep, and the pilgrims visiting the shrine, the sunrise and the shadow of the cone on the air. (See p. 124.)

A paper entitled "Forests and Forestry in America and Europe," by Rev. Henry Lambert, was read by Mr. George L. Chandler. The author dealt with the uses of forests and the methods of forestry in Austria, Prussia, and France, and particularly with schools of forestry in Europe. He then described the small amount of such work accomplished in America, and pointed out what might be done.

July 5, 1893. — Twenty-eighth Field Meeting.

President Fay in the chair.

About one hundred and twenty-five persons were present.

The subject for consideration was "The Relation of Scientific Forestry to the White Mountain Forests."

The President welcomed the guests and friends of the Club, and congratulated the members upon returning to Jefferson to hold a Field Meeting after an absence of eleven years. The scenery was as grand and beautiful as ever. He did not believe that this beauty would be destroyed, but had confidence in that sentiment in man which leads to the preservation of the beautiful in perpetuity. The Council had appointed a committee to consider the subject of the preservation of the forests, and no Utopian scheme, but a business-like plan, if any, would be suggested.

The President introduced, as the "Nestor of the forestry movement in New Hampshire," the Hon. Joseph B. Walker of Concord, Chairman of the late Forestry Commission. Mr. Walker mentioned the importance of the subject, in that sixty per cent of the area of the State was in forest. The State ought to purchase the right to control the cutting, open new roads, and gather statistics for the instruction of the people. By judicious management the forest may be preserved, and made to yield four or five times as many feet of lumber to the acre as at present.

Professor Colby of Dartmouth College, a member of the present Forestry Commission, spoke of the objects of forestry; — the preservation and increase of certain natural advantages of the soil, and the maintenance and increase of Nature's crop, wood. The opportunity which New Hampshire has to apply good forestry is not equalled this side the Mississippi. Until now we have had extensive, rather than intensive, culture. The latter has not paid hitherto, but we are now reaching the danger point. The work of the Commission in the immediate future would be (1) to give instruction and arouse public sentiment, and (2) to give information concerning lands toward the purchase of which interested individuals may contribute. He spoke highly of the work of the Club in the White Mountains, and of the public spirit of its members.

Letters were read from Professor C. S. Sargent, and Mr. George T. Crawford, C. E.

Mr. J. Rayner Edmonds spoke concerning the unique region of high altitudes, and suggested a public reservation of the summits immediately north of Mt. Washington.

Mr. L. M. Watson, of the Ravine House, spoke concerning forestry in his section, saying that, as a rule, only good timber had been cut and fires had been kept out.

Mr. Markinfield Addey, of the "White Mountain Echo," said that New Hampshire should buy the forests herself and not expect outsiders to do it.

Professor Henry J. Jessup, of Dartmouth College, spoke concerning what we have to preserve, — one hundred and seventy species of wood-trees, shrubs, and vines, and forty-three of these, valuable timber trees. The botanists of the party later enjoyed many informal talks with Professor Jessup.

Professor C. H. Hitchcock, of Dartmouth, described the appearance of the forests in 1858, especially near Fabyan's, and alluded to the disappearance of animal life with the removal of the forest.

In closing the meeting, the President mentioned several ways in which forest preservation might be furthered, and bespoke harmony on the part of those interested.

Members added since January, 1893.

CORPORATE MEMBERS.

Almy, Mrs. Annie D., Auburndale.	Moore, Frank R., Newton Highlands.
Ashenden, Clarence B., Auburndale.	Otis, Walter J., Boston.
Bates, Frank A., Lynn.	Parker, Mrs. Alice G., Lynn.
Chadwick, Joseph W., Malden.	Parker, T. E., Lynn.
Church, Walter L., Brighton.	Parrott, Miss Louisa, Dorchester.
Church, Mrs. W. L., Brighton.	Patch, Mrs. Clara E., North Cambridge.
Clapp, George H., Brookline.	Perry, Albion A., Somerville.
Clark, Selwyn B., Worcester.	Porter, Ira C., Hyde Park.
Codman, Benjamin H., Boston.	Potts, William, Farmington, Conn.
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Crane, Miss Eva R., Melrose.	Rich, Edgar J., Boston.
Dana, Arthur P., Boston.	Richmond, Miss Mary E., Baltimore, Md.
Dary, Miss Jeannette T., Roxbury.	Savary, Edward H., Boston.
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Ellis, Miss Helen M., Jamaica Plain.	Snow, William B., Stoneham.
Endicott, Mrs. Frederic, Canton.	Sweetser, D. H., Lynn.
Forbush, Edward H., Medford.	Tebbetts, Charles B., Lynn.
Furber, George P., Boston.	Todd, Miss Hannah M., Boston.
George, Andrew J., Brookline.	Van Ness, Joseph, Ashmont.
Griswold, Leon S., Dorchester.	Waite, Amory H., West Newton.
Hollis, Samuel J., Lynn.	Watson, Mrs. Elizabeth S., Weymouth.
Hosmer, John G., Boston.	Watson, Thomas A., Weymouth.
Hunt, Ralph M., Jamaica Plain.	Webber, William J., Boston.
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Maury, Miss Antonia C., Arlington.	
May, William T., Newton Centre.	
Montague, Miss Annie S., Wellesley.	



SUMMIT OF MOUNT RAINIER FROM THE NORTHEAST.

APPALACHIA.

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A Trip to Mount Rainier.

BY ERNEST C. SMITH.

Read April 11, 1898.

MT. RAINIER, the finest peak in the Cascade range of mountains, is situated in the southeastern part of Pierce County, Washington. From the city of Tacoma it bears south 56° east, and is distant about forty-four miles in an air-line. Two principal trails give access to the mountain. One of these leaves Wilkeson, on a branch of the Northern Pacific Railroad, and leads southward, ascending the northwest spur of the mountain to the Carbon and North Puyallup glaciers. The summit itself has never been ascended from this side. The other trail, known as the Succotash Valley trail, can be reached either from Tacoma or from Yelm Prairie. For twenty miles it follows the valley of the Nisqually River, leaving it only when the glacier which fills its upper portion is reached. This trail gives access to Paradise Valley, the Mecca of mountain-lovers in the Northwest, and to the ridge by way of which all ascents of the mountain have so far been made. This trail our party took.

While waiting at Tacoma for the train, we had a fine view of the mountain across the level stretches at the head of Commencement Bay. Our hearts beat high. We could scarcely refrain from shouting, and telling the bystanders that we were going to "the mountain," though our dress and camp equipage made such declaration entirely unnecessary.

Noon found us at Yelm Prairie with our pack train ready for the start. The hot sun of July had burned the grass and flowers of the prairie to a crisp; but as our cavalcade swept — or, shall I honestly say, crawled — along, many a park-like bit of beauty passed before our eyes. The perfect symmetry of the young Douglas spruces, the picturesque groupings, the smooth stretches of turf, now yellow, but smooth and even as a well-kept lawn, called forth frequent expressions of admiration from our party.

Soon after starting, we entered the timber, from which we emerged only for short intervals until we reached the mountain meadows. A wagon road made the first twenty miles of our journey comparatively easy. The first night we rested at Indian Henry's, and in the morning, leaving the wagon road, entered upon a pack trail not in the best of condition. Our way wound through dense forests of grand old firs and cedars, standing straight and tall like the pillars of some gigantic cathedral. Beneath, the vine maples, with their tender green, made leafy chapels. On every side graceful clusters of tall waving ferns — *Lomaria* and *Aspidium* — brought their contribution of beauty to "the perfect whole."

We camped that night in the dense woods by the side of a brawling stream. The next day we travelled through the same grand forests, until, about noon, we entered the lower end of Succotash Valley. This name is a corruption of the Indian word *Suh-ho-tas*, which means "black raspberry." The fitness of the name was well sustained by the abundance of the fruit which tempted us to linger by the way. We were soon through the open land and in the timber again. For several miles the road is over rocky river beds, crossing small tributaries again and again. There is one dangerous ford, where a member of our party came near losing her life. It was long after dark when we reached Longmire Springs (2,700 feet altitude), our resting-place for the night.

Daylight disclosed an opening several acres in extent, nearly level, and somewhat swampy. From half a dozen openings bubbled forth water heavily charged with soda, magnesium, and iron. Mr. James Longmire discovered the



springs in 1883, and later discovered mineral paint in the same locality. He and his son have both taken mineral claims, have built log dwellings and rough bath-houses, and have done much to open and maintain a proper trail into Paradise Valley.

Leaving the Springs, we rode through woods and in old river beds over a difficult trail. Occasionally the top of the mountain came into view above the trees. Many times a sudden twist in the trail would give us the view we longed for, then, in a tantalizing way, would bring a big cone-shaped butte directly between us and the object of our desire. Four miles of such travelling brought us to the ford or bridge over the Nisqually. The glacier is only a quarter of a mile above in plain view. The stream is here very rapid, rolling good-sized boulders along, and making it exceedingly dangerous to ford, as is sometimes necessary when it suddenly changes its course or the bridge is carried away. Fortunately for us, the bridge was in position, and we passed over safely, with the exception of one of the riding horses. He did not appreciate mountain bridges, and refused to walk the log. He bolted into the stream, was rolled over several times by the torrent, and being saved by a shallow a little lower down, consented to be led over the bridge after all.

As the glacier was so near, we made a short visit to it. The way was over coarse morainal deposits, all the finer matter having been carried off by the stream. All signs declared that the glacier was now small in comparison with its size at some former time, yet it is still majestic. Besides, was it not our first glacier? Streams of water flowed over its surface, and mingled with the river, which gushed from an arched cavern in the centre of its face.

But a long climb was before us, and we turned from the glacier and the river to the steep ascent which walled them in. The slope is about a thousand feet in height, and so steep that even with an excellent "switchback" trail, few people dare to ride either up or down. The hillside is heavily timbered, and abounds in beautiful and interesting flowers. Near the base we found both species of the dainty

little *Listera* and the tall spikes of the *Pteronospora*, that northern congener of the snow-plant of the Sierras. Farther up we found the dainty little *Gaultheria Myrsinites* in fruit, most delicate of all checkerberries, and the pure white blossoms of *Moneses*.

After reaching the summit of the ridge we descended a short distance into a park-like meadow, bright with blossoms. *Asphodels* and purple-blossomed grasses struggled with asters for the supremacy, while the meadow was fringed with mountain rhododendrons just bursting into bloom. The asters (the learned call them *Erigeron sal-suginosus*) were found all the way from an altitude of four thousand to six thousand feet, and were a delight and joy to us during our whole stay at the mountain.

We were soon out of the first park and in the woods again, climbing ever higher. But the parks were frequent, and each one had some new beauty to display to our admiring eyes. We passed through solid masses of what at home I used to call garden heliotrope, but which here I dared give no less sonorous title than *Valeriana Sitchensis*. Its fragrance was so rich and heavy as to be at times almost overpowering. As we went higher, the ground became more open, the trees changed to alpine species of fir and hemlock, patches of snow set off the rich green carpet of sedges and the beds of bright flowers. One valley was literally carpeted with the beautiful bells of *Erythronium grandiflorum*; another, more varied in its taste, was gay with *Senecio*, *arnica*, *valerian*, asters, and thick beds of pink heather (*Bryanthus empetriflorus*). These flowery slopes form about the mountain a zone two thousand feet broad on an average, though some species blossom at eleven thousand feet. Mr. John Muir has very happily christened them "The Lower Gardens of Eden." Whether one is a botanist or simply an unlearned lover of flowers, he must find delight, yes, rapture, in the beauty here spread at his feet. What wonder that one of the valleys (the largest on the southeast side of the mountain) should be named Paradise Valley, and the stream that flows through it in melodious cascades, Paradise River!

Only five weeks before, the report had come to us that the snow in this valley was ten feet deep; but now it was certainly midsummer there. The interval is open, with few trees, but those arranged in most exquisite groups. One of these groups, containing ten firs and a hemlock, I shall never forget. At the upper end of the valley, the glacier-fed stream dashes over the rocky wall in a fall and cascade which together make a vertical descent of nearly a thousand feet. They were christened Sluiskin Falls by General Hazard Stevens and Mr. P. B. Van Trump, in acknowledgment of the services of their Indian guide. As these gentlemen were pioneers in that region, the name should stand, though many later visitors have referred to them as Paradise Falls.

Near by, met by the spray of the descending waters, the botanists of the party discovered several species of saxifrage, and higher, on rocky ledges, the little red penstemon, which some of us had years before gathered in Yosemite Valley. Following the ridge westward directly towards the mountain, new flowers constantly met our gaze. Tall anemones with feathery carpels, the Alpine bistort, several species of *Pedicularis*, gentians, asters, white heather, and the glowing berries of the mountain ash are only a few of the plants that pressed upon our notice.

But we have looked down at our feet too long. Let us "lift up our eyes unto the hills!" We are standing on the ridge which forms the northern wall of Paradise Valley, at an altitude of 6,650 feet. We look down twelve hundred feet into the valley across it to the south, and there, barring out the world of civilization, stand the Tatoosh Mountains, a range of twelve rugged, rocky peaks covered here and there with patches of snow and ice. The peaks are not high, the chief among them being hardly more than eight thousand feet; but I much doubt if one small range of mountains could be more beautiful than the Tatoosh. And to cap the climax, Rainier itself towers above us to the right in solemn grandeur. As we gazed, a great stillness came upon us; beauty and awfulness were blended: our feelings were too deep for words.

At last, however, we looked down again, and took note of things nearer at hand. Our camp was pitched at the tree limit. Many of the straggling hemlocks, bent by the prevailing winds, were hardly higher than a man's head; but they gave us abundant bedding and fuel. Thirty feet from our tents was a hollow filled with packed snow, which served us well as a refrigerator. A hundred yards farther up the ridge a stream supplied us with ice-cold water, and sometimes literally with ice water; for on several nights the stream froze. When the clouds did not hang about the summit of the mountain, we could plainly see the black rim of the crater on the central peak. Often did we turn our field-glasses upon the face of the mountain directly towards us. The upper part of the Nisqually glacier, where most seamed and gashed, sometimes appeared startlingly near. Many times, while watching, I have seen some great white cliff topple forward and coast downwards, leaving a fleecy cloud to mark its course. There was always something eerie in the silence with which this happened, as there was also something startling in the booming and crashing that came when all was still where the slide had been.

It was my desire to explore the eastern side of the mountain with some thoroughness, and various trips were taken on different days.

On one occasion Mr. Amsden, the photographer of our party, Mr. Van Trump, and myself made a circuit to the south and west. Early in our trip we had to cross the Nisqually glacier in its lower course. This was a difficult, and at times dangerous, undertaking. The lessening glacier had left huge lateral moraines, in which boulders were easily loosened, and where one could never be sure of his foothold. On one side we had to climb over three such moraines, the greatest of them being forty feet in height. The surface of the glacier showed the characteristic features of most alpine glaciers, — crevasses, pillars, cones, etc. Having successfully reached the farther side, we made directly up the mountain, on the ridge which bounds the Nisqually glacier on the west, until we reached an elevation of perhaps nine thousand feet. Here Mr. Van Trump

knocked over a ptarmigan with a stone, as it hid behind a boulder. The bird was in its summer plumage, and was hard to distinguish among the stones.

We struck westward, hoping at such an elevation to get to the west side of the mountain without covering many miles. But we had reckoned without our host, for after traversing a great snow-field, we found ourselves on the brink of a precipice which no human being could descend. We were discouraged, for it would take two hours to go down around the lower end of the ridge and gain our elevation again on the other side. Still, we got something for our pains, as we made the acquaintance of two striking masses of rock, which we named Gog and Magog. One of these, seen from a certain point, shows two faces in profile. The smaller face is as clean-cut in outline as the "Old Man of the Mountain" in Franconia Notch; the other is a huge, grotesque face, of which the first forms a part. This cliff we were able to photograph.

We did not retrace our steps, but turned away from the mountain, and attempted to descend, keeping our course near to the ridge we wished to cross. But here, too, our way was barred by slopes of ice too steep to risk ourselves upon, especially as we had no ice-axe with us that day, but only our alpenstocks. A long and tiresome detour was the only practicable plan. This we tried, and were rejoiced, on coming back to the ridge at a lower level, to find a place we could scale. We had some illustrations during this detour of the difficulty of defining the limits of ice and névé, for firm, compact ice peeped out again and again at different points in what at first sight seemed to be a snow-field. The time was August, and there had been no recent snowfall, so we certainly did not confuse fresh snow with the névé. But it seemed as if what would ordinarily be mapped as névé was good hard ice, covered with snow to a considerable depth.

After getting over the ridge, we crossed the lower portion of a small glacier, which came to an untimely end. The amount of snow on the southern face of the mountain is small as compared with that on the northern face. Owing to that

fact, this particular glacier attains a lower limit of only six thousand feet. However, it was fair to look upon, for no overhanging cliffs had strewed its surface with rocks and dirt. On the next ridge we had the good fortune to fall in with two mountain-goats. They swept out of the undergrowth close by us, and were away on the next ridge almost in the twinkling of an eye. It is very unusual to get so near them, as they are shy, and retreat to the higher ridges when parties camp in the valleys. We had no firearms with us; had we been so provided, I doubt if we should have used them. It was enough for us to get so near and have so fine a view of them.

Down we went into the next valley, and up the ridge beyond. Here we found the hillside white with a species of *Gilia* that we had never seen before, which proved later to be *Gilia Nuttallii*. As *Gilia intertexta* and *Gilia debilis* had already come in our way that day, we were doubly glad of this new find to put with the old friends. On this same ridge we saw the bleached roots and branches of an Alaska cedar (*Chamæcyparis Nutkatensis*), which had been uprooted by the winds, and whitened by the weather.

We finally gained a position southwest of the southernmost peak of the mountain, near the lower part of the South Puyallup glacier as it appears on Bailey Willis's map, but which, in reality, feeds the Rainier Fork of the Nisqually River. For such a view I would gladly take twice as long a trip as it cost us. We seemed to be looking into the heart of the mountain. Long ridges extending to the southeast and to the west-southwest framed our picture, and gave the impression that the mountain side was hollowed out rather than bowed, as it appeared on the southeast. For a long distance down from the summit the face of the peak is bare, the slant being so steep that the snow can find no resting place. But snow-fields there are, making the sharpest of contrasts with the bare brown rock, each heightening the effect of the other. Far up on the right, close by the ridge which forms our horizon, a glacier takes its rise. It is not a small glacier, but in the tremendous expanse spread before us it seems a narrow band, twisting and curving as it



SUMMIT OF MT. RAINIER, FROM THE SOUTHEAST.

descends, now flowing westward, now south, then bending to the southeast as it plunges into the gloomy cañon hundreds of feet below the cliff on which we stood. We were at the upper end of Indian Henry's "Hunting Ground," and we wondered if white men had ever before gazed upon this view which held us spellbound. If so, they had left no record of their visit.

But the nearer view also had its charms. The cliffs on the right of the cañon are full of interest. They seem to have been cleft in the middle, so that while one side shows a gradual slope, covered with turf and dotted with clusters of trees, the other side for some distance shows a perpendicular face of rock. From our vantage point we could see the cliffs that in the morning barred our way, and the small glacier and the two cañons we had crossed. The whole southwestern portion of the mountain was before us; all its features were visible; but one thing we could not do, — we could not make the features spread before us agree with the maps. Finally, we concluded to accept the panorama displayed before us, and let the maps go.

For some time the light had been growing feebler, and we were far from camp. It was reckless to have remained so long. We started at break-neck speed in a mad race to reach the dreaded Nisqually glacier before the sunlight was quite gone. We just succeeded, and then slowly, wearily, with dejected air plodded over the distance that remained to camp. Never before or since have I been so weary as on that memorable night; and never has a day spent in sight-seeing so richly repaid my pains.

The following day we took no long trip. We were quite content to remain near the camp, busying ourselves with the care of the plants we had collected during the preceding day, and in preparations for the morrow.

Our next trip was towards the north, over the small glacier that feeds Paradise River. The grade is easy, and the surface comparatively smooth, so we made rapid progress. Near the northern limit of the ice-field our attention was drawn to a sudden dipping towards the east. Turning in that direction, we found that the abrupt change of grade had

produced hundreds of crevasses at right angles to the glacier's course. The single crevasses are not of great extent, but they are so numerous and run into one another in such a way that crossing them is out of the question. As far as we could judge, they were about a hundred feet in depth. We saw crevasses on other glaciers much greater in extent, and much more formidable; but these had a special claim on our attention, because of their accessibility. Sloping as the glacier does to the east, the rays of the morning sun light up the yawning chasms to quite a depth. The surface is gleaming white, unstained by rocks or dirt. Deep down the walls of ice are an intense blue, of a shade I have never seen elsewhere, while the upper portions of the walls, where the sun's rays strike, shine like crystal. With great pains and exceeding care we worked our way out upon one after another of the tongues of ice which projected into promising chasms, seeking a place to set the camera, that we might bring away some graphic reminder of our visit. After two hours' cautious exploring, success crowned our efforts, and we went rejoicing on our way.

The northern boundary of Paradise glacier is a rocky ridge which barely rises above the ice, and not even that on the end towards the mountain. This ridge forms the southern wall of the great cañon in which the Cowlitz glacier is confined for a portion of its course. This cañon we approached at its upper end. The glacier we were traversing became a snow-field, or rather its surface was covered with snow to a depth of six feet or more. Over a rounded lip we looked down into the chasm at our feet. A smooth surface of snow stretched almost to the bottom, nearly a thousand feet below. But before we coast into the depths, let us fix the prominent features of the scene which holds us spellbound.

To our left a glacier, with its source among the snow-fields which extend to the very summit of the mountain, seems to be plunging directly towards us. But just before reaching our standing place it leaps into the abyss at our feet. Its surface is broken and seamed and scarred in all directions, while in one part jagged masses and irregular pinnacles rise



UPPER COWLITZ GLACIER.



LOWER COWLITZ GLACIER.

to a height of thirty feet. The ridge which forms its northern boundary approaches the south at the head of the cañon so closely that the ice river, which farther up is a mile in width, is narrowed to about two hundred yards as it takes its plunge. This ridge terminates in a castellated rock mass consisting of several well-defined layers or tables, each succeeding table smaller than the one below. Beyond and above this unique structure towers a perpendicular wall of rock clearly outlined against the sky, nearly a thousand feet from base to summit. Its altitude, estimated by comparison with points whose altitude is known, we judge to be near eleven thousand feet. This is the Cathedral, whose bold outline had attracted us even while we were only a short distance from camp. It is still a long way off. Between it and the Table Rock is a great gorge, through which a second glacier pushes its way, eager to join forces with its neighbor on the other side of the barrier. And still more distant, east of the Cathedral a third glacier plunges down towards a gap in the northern wall of the cañon.

We gazed long and appreciatively, then braced ourselves for the drop into the chasm before us. The wall was very steep, and covered with snow just hard enough for successful coasting. We stood erect, then leaned back slightly against our alpenstocks, and the wild flight had begun. We had practised the glissade on smaller slopes near camp; but this was quite a different matter. Down, down we swiftly flew, every faculty on the alert to spy danger if present, now turning to the left, now to the right, avoiding rough places and openings, until at last we stood at the bottom of the slope safe and sound. Only he who performs the feat can understand and appreciate the exhilaration of such a coast.

When we had recovered our breath and rested a little after the excitement of our descent, we pushed out on to the ice. It was slow travelling, for though the crevasses nearly all take the same direction, they are very numerous, and we could not follow any one crest for a long distance. Besides, we did not wish to cross directly, but diagonally. In the main we found good footholds. Sand and fine gravel cover nearly the whole surface. Alternate melting and freezing

had given the particles a firm hold in the ice, making a surface on which it was well-nigh impossible for the caulks of our boots to slip. It was easy to see whence came all the boulders, sand, and gravel which cover the surface. Table Rock had contributed of its substance to both glaciers as they passed by on either side. When they united, a huge medial moraine was formed. Each had also brought a lateral moraine on its outer side. So there are three moraines on the glacier in its lower course. The finer material is carried away from these by the streams formed by the melting of the fresh snow which falls upon the glacier, and so is distributed over its surface.

We slowly worked our way down the cañon, discovering that the glacier we had noticed on the north did not, as we had supposed, unite with the others, but finished its course a few hundred yards before reaching the main stream. Some of the openings in the ice which we had to go around were of great extent. One in particular impressed us as being big enough to comfortably swallow a man-of-war. As we went down the glacier, the northern wall of the cañon grew higher, until it reached one thousand to twelve hundred feet in vertical height. In places this wall is nearly perpendicular. Two or three small streams fall over its upper edge and lose themselves in the talus below. In some portions of the wall the basaltic structure is very marked, the whole face of the cliff being composed of long parallel columns. Of still greater interest is a formation which we noted at the upper end of the cañon, where the wall is low. The columnar structure is equally marked; but the columns radiate from a centre, and the section presented shows the ends rather than the sides of the columns. It seemed as if some mighty projectile had been hurled against the wall, and, in being flattened, had assumed a rayed form.

We endeavored to ascend the ridge leading to the Cathedral, but found the task so difficult that we postponed the attempt, and made our way back to camp. On this ridge we found a species of pine, for which we had looked in vain in the southern and southeastern slopes of the mountain, — *Pinus albicaulis*, or white-barked pine. We also found many

other interesting plants. The climb up the southern wall of the Cowlitz cañon is difficult at best, but by making a detour to the east we found a place where the ascent was less laborious than where we had taken our slide into the depths. As usual, it was after dark when we reached our camp.

Early one morning Mr. Amsden and myself took the nearest route to the Cowlitz cañon, coasted again into its depths, carefully made our way across the glacier, and again essayed the ridge leading towards the Cathedral. Part of the time we were clambering among rugged, almost perpendicular cliffs; again we were toiling up steep slopes covered with shifting pumice, and again we were on high snow-fields. As we advanced, the Cathedral seemed to recede. From its highest point a thin ridge ran towards the northeast. Between this and the like ridge, whose southern face we had seen on our previous trip, lay a snow-field, which seemed miles in extent. Over this we tramped, still ascending. In the early afternoon we reached its farther side, and through a window in its bounding ridge looked out over the great system of glaciers which feed the White River. It was a happy moment, for we had not felt sure of getting through at such an altitude, no one ever having achieved the feat before; but even now the prospect was somewhat dubious. The northern slope of the ridge on which we stood is very steep. The first fifty feet of the descent is over loose rocks which give but a treacherous foothold, then several hundred feet of icy snow, at the bottom of which is a crevasse just broad enough to catch the one unwary enough to miss his footing. Beyond this comes another snowy slope, and still lower a glacier which promises nothing but defeat to him who endeavors to cross it. Nevertheless, we plucked up our courage, shouldered our packs once more, and began the descent. There were several moments when we wished ourselves well out of the scrape. It seemed equally risky to proceed or to go back. But patience and activity, cautiousness and recklessness, each when it would serve our turn, finally brought us in safety to the lower side of the crevasse. We were afraid of the slopes directly below, and so bore westward towards the upper end of a ridge which divides the glacier fed by the

snow-fields of the Cathedral from that fed by the snow-fields of the mountain proper. Passing around the head of this ridge, we worked our way down its western side until stopped by impassable crevasses. We then climbed over the ridge at a point where the passage was not difficult, and to our joy found the ice on the other side quite easy to cross. As the sun was getting low, and the evening chill was making itself felt, we made for the nearest land. This we reached at about the timber line, for we had been descending the greater part of the afternoon. We had just time to cut some boughs for our bed before the darkness came. Then, wrapping ourselves in our blankets, we slept the sleep of the tired.

Sunrise found us at the highest point on the "wedge" on which we had camped. Of the three peaks of the mountain, the eastern, or Crater Peak, and the northern, known as Liberty Cap, were directly before us, bearing slightly west of south. Farther east in the same line towered the Cathedral, with Gibraltar nestling in the hollow between it and Crater Peak. From a rocky ridge extending northward from the Liberty Cap clear around to the eastern side of Crater Peak, the mountain is one expanse of dazzling white, broken only by two narrow parallel ridges which begin at eleven thousand feet and extend northwards. Above the white, the dark rim of the crater is outlined against the sky. This view, though different in character, was quite as impressive as that on the south. There we had seen great faces of rock, over which snow-fields were scattered. Here we gazed on an even broader expanse, solid white, with a few ridges of rock marking its surface. And off to the left, on the spur of which the Cathedral is the head, snow-fields stretched as far as the eye could discover. The upper portions of the glacier which they fed we could see, but much was hidden from us in the valleys. That part we had to take for granted, relying on John Muir's statement that the main glacier which feeds the White River is twelve miles long. We estimated its breadth opposite our standing place at about a mile and a half. It seemed to grow broader in its lower course. We wished to go farther, but we were expected

back at camp that night; so, regretfully we left our observatory and began our homeward march. A straighter course was taken than on the preceding day.

From our observatory we had picked out what seemed a practicable route over the slope we had before avoided. Availing ourselves of the patches of snow which covered the inequalities of the ice, and using our hatchet freely, we gained the summit of the ridge in about half the distance we had covered in descending, though not, alas, in half the time. From that point we retraced our steps of the previous day over the snow-field, down the crags, sliding and skipping down the pumice-covered slope across the Cowlitz glacier, up the steep southern wall of the cañon, having to kick footholds in the hard snow nearly all the way, down the gentle slope of Paradise glacier, and into camp about an hour before sunset.

One member of our party, Mr. R. R. Parish, had made the trip from Portland, Oregon, with the sole purpose of ascending the mountain. Indeed, we all longed to stand on its summit. But that pleasure was in store only for those who were both hardy and in the best of condition, so some did not even make the start. August 9 was the chosen date. The greater part of the forenoon was spent in preparations, — laying out proper rations, renewing hob-nails now worn with hard usage, and making up our packs. As we set out from camp we were a rough-looking set, but we were prepared to camp out in the snow three days if necessary. In addition to my regular pack, I carried a canteen, a hatchet, a prismatic compass, fifty feet of rope, and a mercurial barometer. Mr. Amsden carried, in addition to his blankets and provisions, an 8 × 10 camera. Miss Fuller, of Tacoma, who succeeded in reaching the summit, was clad in Turkish trousers and a short, full skirt of blue flannel, with blouse to match. All members of the party were provided with goggles and dark veils. The start was made at 11 o'clock A. M.

A hundred yards from our camp we took to the snow. It was cloudy, and somewhat threatening. Before long we entered the clouds. We kept close together, for we could hardly distinguish objects a hundred feet distant. It seemed

as if our start would be useless. But on we pressed, over long snow-fields, and at last emerged into bright sunlight above the clouds. For once we saw their traditional silver lining, and were duly thankful. There was no particular danger in this day's climb, but plenty of fatigue. Carrying a pack up a steep slope of snow on a hot August day starts the perspiration on even the most hardened mountaineer. It was a pleasant change when, for a little while, we followed a ledge of rock which stood out above the snow. In the clefts we found plant and insect life in great profusion. Most conspicuous were the asters, a yellow-flowered *Erigeron* (*E. Chrysopidis*), the white bells of *Cassiope* (*C. Mertensiana*), and a pretty reddish-brown grass (*Agrostis Piperi*). Not content with single blossoms, they appeared in thick mats, gladdening our eyes with their delicacy and their bright hues. Even on the open snow fields we were surrounded by swarms of insects, including a few stray butterflies. As we advanced, the mountain seemed to grow larger as well as nearer. Points that appeared close together when viewed from camp were now unaccountably far apart. The side of the mountain directly in front of us seemed more majestic and inaccessible than ever before. The Nisqually glacier was grander and more wild.

About five o'clock we reached the base of the Cowlitz Cleaver, a rugged ridge which forms the divide between the Nisqually and Cowlitz glaciers for a portion of their upper course. On the Cowlitz side the grade is very abrupt, the surface of the glacier being six hundred or seven hundred feet below. There is a fair camping-place here, for there is some bare and fairly level ground, with crumbling pumice as the foundation for a bed. This spot has been christened Camp Muir. At six o'clock another detachment of our party, five in number, put in an appearance. Mr. Longmire had packed a tent instead of blankets, so his squad was well provided for during the night. An observation of the barometer showed an altitude of ten thousand five hundred and fifty feet. In screwing up the cup after the observation, the tube of the barometer burst, so no further readings could be taken.

Near sunset the most beautiful cloud effects were visible. At our feet the great snow-fields stretched away and down to a boundary line as straight as if drawn by a rule. From this as a shore-line, there stretched away a sea of snowy and pearl-colored clouds unbroken save where, fifty miles to the southward, Mt. Adams proudly raised its head, a pearly island in a sea of pearl. The brightness faded from this mysterious and beauteous sea; but still in the heavens above, still around the head of our mountain, the sunset glory lingered; then there, too, it faded, and the night had come.

We had brought materials for a torch. At exactly nine o'clock this was lighted, and waved in the air. Our friends below saw our signal, and answered with three reports of a gun.

At half-past four the next morning we arose, shouldered our blankets, and began our climb. The way was both difficult and dangerous. The Cleaver leads directly to the base of Gibraltar, a mighty mass of rock not unlike El Capitan in the Yosemite Valley. This arête is gradually crumbling away. It rarely affords a trustworthy support for hand or foot. At almost every step great boulders are started, which thunder into the depths below. This ridge is, however, the only approach by which the mountain has ever been ascended. So up we go. "Look out!" "Below there!" are frequent cries, followed by a slide of gravel or the crash of a boulder. We follow a ledge; it ends abruptly. Back on our trail we go, and try another ledge. That, too, leads nowhere. But half way back on this ledge we find a place where, helping each other and using the rope, we climb to a ledge above. At last we stand on the crest of the ridge, and follow its back-bone. At one place, stopping to take breath, we get a magnificent view. In the foreground is a characteristic bit of the Cleaver; to the right, two peaks of the Tatoosh Range peer above the clouds; to the left, far down, is the Cowlitz cañon. We see the great medial moraine of the glacier and the crevasses in even curves bowed out at the centre where the motion is most rapid; we get glimpses of snow-fields and ridges over which we have painfully climbed on other days; and lastly we see the dis-

tant peaks of Mt. Adams, Mt. St. Helen's, and even Mt. Hood. One of the party is taken sick, and by the time we reach the base of Gibraltar, only five of the nine who started in the morning think of going on.

The route along the face of Gibraltar is the "Passage perilous." The southern face of this rock is perpendicular. The Cleaver leans against this face about half way up. From this point to the snow-cap of the mountain a narrow ledge stretches across the face of the cliff, ascending at a grade of one foot in three. Besides being narrow, it shelves away from the wall, and does not always afford a firm footing. Along this ledge we pass. I set my alpenstock, then firmly plant my foot, then set the alpenstock again. There is little chance to take hold with one's hands, for nine out of ten projections which offer themselves are rotten, and give way at a vigorous strain. We walk, we crawl, we go singly, we use the rope. We do not tie ourselves together, but at certain places put one in a loop of the rope, while all hold on. Then this one who has gone ahead helps the others over. At last the end of the ledge is reached. A wall of solid ice now confronts us, with a slope of about forty degrees. The leader gets into a loop in the rope, steps out from the cliff, and cuts step after step in the ice wall. The sun is now high, and from the cliff above, pebbles and occasionally good-sized stones come rolling and bounding down, much to the discomfort of the ice-cutter. A harder blow than usual with the hatchet strikes through to a hidden reservoir, and out gushes a stream of water. But the distance is only fifty feet, and soon we are at the top of the slope. Noon finds us lunching on top of Gibraltar.

A narrow ridge connects this rock with the snow-cap. Along this runs an aisle with walls of ice three feet high on either side. Through this we walk, glad enough to have a parapet between ourselves and the gulfs on either side. Once fairly on the snow-cap, we find the snow in ridges, which can best be likened to slabs set on edge, with hollows two or three feet deep between them. Progress is necessarily slow. We lose our breath every few minutes, and come to a standstill, but soon go on again. We come to the

first crevasse, or bergschrund. Fortune favors us. A bridge of snow spans the chasm. Roped together, we cross it without mishap. We reach the second schrund. It looks dangerous. Must we give up, now that we have come so far? No! Here is a place where the walls approach each other, and the upper wall overhangs. We piece alpenstocks together, lean them against the upper edge, and up one of our number climbs. The rest is easy, for he sets his alpenstock far back in safe position, and ties the rope firmly to it. The others follow. Soon we stand on the crater's rim. But the crater is nearly half a mile across, and the highest point is on the farther side. Along the crater's rim we pass, hardly able to stand against the furious wind which threatens to tear us from our foothold. At last we stand on the very summit, 14,444 feet above the sea. It is a sublime moment. A deep silence falls upon our party.

A few clouds cling in the valleys below, but our gaze travels out, out until it seems as if the ends of the earth must be within the range of our vision. Yet the world we see is a world of mountains. They rise, range behind range, like the serried ranks of a mighty army, with here and there a snow-clad monarch standing out from the common herd. Mt. Baker, two hundred miles to the north, is easily distinguished; the peaks to the southward, even beyond the Oregon border, are distinctly outlined against the sky; eastward are long mountain ranges; westward the rugged Olympics close our view, shutting out from us the ocean. Between us and the Olympics lie the waters of Puget Sound, but over them hovers a veil of cloud. I have stood on other mountain summits, but never on one that so overtopped all its mates, where I felt so completely lifted above all barriers, where the effect was so like a bird's-eye view.

At last our gaze wanders back from the distant horizon to the wonders and beauties at our very feet. Down and out from us stretch the snow-fields and the glaciers; down and out stretch the ridges; down and out, spreading like open fans, stretch the mountain's spurs; down and out open the valleys, with their graceful groves and brawling

streams. In this one view we sum up and combine the results of all our previous trips and explorations. The northwest peak is a mile and a half distant, apparently inaccessible; the southwest peak only half a mile away, and easy of approach. We are standing on a central common rim between two craters. The larger, half a mile across, slopes to the east; the smaller, less than a quarter of a mile in diameter, is inclined to the west. These craters are filled with hard packed snow, above which the rim rises to a height varying from twenty to sixty feet. Outside the rim is bare for a hundred feet down. Steam jets issue from numerous openings in the crater wall. In some places these have hollowed out caverns in the ice. To one of these caverns we flee for refuge from the wind and the intense cold. Two of our number are sick, and none of us fit for much exertion. The steam heat, however, thaws us out, and soon we are as merry a party as one would wish to see. With alpenstocks we level off a sleeping platform, and, wrapped in our blankets, lie down to sleep. Despite the steam heat in our chamber, we suffer severely from the cold. There is a slight fall of snow during the night, but it does not penetrate to our sleeping apartment, for the ice wall curves over in a way to protect our beds.

Next morning we find ourselves on an island just emerging from an ocean of cloud that stretches unbroken to the horizon. The sky above is clear and blue, making our isolation in space still more impressive. Up out of the rolling sea of cloud springs the sun, changing the dull gray of that sea to glistening pearl.

We long to stay; but, mindful of that cliff where sunshine loosens the stones, we regretfully say good-bye to the crater, not forgetting to take some good-sized mats of green moss as mementos of our unique bedchamber. Back over our own trail we go, finding it necessary again to cut steps in the icy slope. Slowly we make our way along the dangerous ledge, seeming more dangerous now because we are no longer spurred on by the desire to reach the summit. Down over the lower snow-fields we coast, picking out the shortest cuts. By three o'clock we are in camp, hearing our friends



MT. CHACHANI, FROM THE AREQUIPA OBSERVATORY.

From a photograph by William H. Pickering.

tell how they watched us climb over the white dome, and relating to them the story of our adventures.

A few days later we broke camp and returned to civilization; and ever since, as we gaze upon the white wonder from our home, we have felt a delightful sense of companionship with it which can only be born of close acquaintance. We can never forget that we have stood "upon the heights."

A Climb in the Cordillera of the Andes.

BY WILLIAM H. PICKERING.

Read December 18, 1898.

THE great range of the Andes consists, not as many people suppose, of a single line of high summits reaching from the Isthmus of Panama to the Straits of Magellan, but rather of several ranges placed more or less end to end. These ranges are separated by passes, or sometimes by broad level areas of considerable elevation and many miles in extent. To the west of these lies the Cordillera, which is composed of a long row of volcanic peaks, many of them at present extinct, or nearly so. In Chili these peaks coincide with the main range. In Peru and Bolivia the distance between the mountains proper and the volcanoes broadens out to between two and three hundred miles, the intervening table-land in general maintaining an altitude of from 12,000 to 15,000 feet. Upon this table-land lies the great lake of Titicaca, nearly one hundred miles in length and 12,500 feet above the sea, — the highest lake of its size in the world. It was upon the borders of this lake that the ancient Inca civilization took its origin, and not far from it, in Cuzco, that it reached the zenith of its magnificence. The relics of its former glory are still to be seen in the form of numerous gigantic ruins scattered over the country in different directions. Why the Incas should have chosen the section having perhaps the most disagreeable climate within their dominions to be the

seat of their capital city, still remains a mystery. The mean temperature of this vast region is but a few degrees above the freezing-point, and the variation is but slight from one end of the year to the other.

Lake Titicaca is connected with the sea by the Railroad of Southern Peru, which joins the town of Puno on the lake with the port of Mollendo. Upon this road, one hundred miles from the sea, lies the city of Arequipa, near which is located the Boyden Astronomical Station of the Harvard College Observatory. This station is situated at an altitude of 8,060 feet. Its horizon on the north and east is bounded by three extinct, or nearly extinct, volcanoes. To the eastward, at a distance of eighteen miles, lies the long ridge of Pichupichu, 18,600 feet in altitude; northeast, at a distance of ten miles, lies the Misti, 19,200 feet in height; while to the north, and twelve miles distant, is Chachani, with an elevation of 20,000 feet above the sea.

With such enticing summits so near at hand, we were not long in planning our first mountain excursion. This expedition was to the summit of the Misti, the nearest, and in some respects the most interesting, of the three mountains.

The party, which consisted of Messrs. S. I. Bailey, A. E. Douglass, G. T. Vickers, the present writer, and the guide, started on muleback at eight o'clock upon the morning of April 25, 1891. We rode fifteen miles to Chiguata and breakfasted, and then ten miles farther to the Alto de los Huesos (high plain of bones), where we passed the night. We slept out of doors in sleeping-bags made of gunny-cloth lined with alpaca skins, as we did not care to try the *tambo*, or public hut.

We did not rest long, but were up by one o'clock in the morning, and off by two. I myself had slept about three hours out of a possible five. The moon was two days past the full, and gloriously brilliant. The altitude, as determined by the mercurial barometer, was 13,110 feet, and the temperature when we rose stood at 31° F. We mounted and rode to an altitude of about 15,000 feet. My mule's heart was then going like a trip-hammer, and he positively refused to move another step. We accordingly all dismounted, and

began the ascent on foot. Our trail lay over loose scoriæ and sand lying at the greatest angle of possible slope. We had considerable baggage with us, including cameras, meteorological apparatus, sleeping-bags, wraps, etc.; and about a dozen porters had joined us at the *tambo* to carry our belongings to the summit.

We now had our first experience with Indian guides and porters, and found them in some respects rather unlike those of other nationalities. Having ascended various mountains in different portions of the world, and having been usually encumbered with more or less apparatus of various kinds, I had had some experience with persons of this class, and had always found them, when loaded down with thirty to fifty pounds of baggage, not very active companions. In fact, when I knew the way myself, and so could go ahead alone, it always became a question of how long I should have to wait for my porters upon the summit. Although I lay no claim to extraordinary speed as a climber, yet I have always found myself a fairly good walker upon mountain expeditions. So on this occasion, when I found that my baggage was rather more weighty than I had expected, and that my men must each be very heavily laden, it was with some annoyance that I looked forward to waiting for them several hours, high up upon the side, or perhaps on the very summit, of the mountain.

It is the general experience among climbers that one should not start off at full speed at the beginning of a climb, but rather take it more moderately and husband one's strength. I was therefore very much surprised to see these Indians, who certainly ought to have known their business, begin by rushing ahead at a rate of speed that I, entirely unencumbered with baggage, found it very difficult to maintain. It presently struck me rather forcibly that perhaps I should not have to spend so much time as I had anticipated on the summit waiting for my baggage. At this time I was doing my very best to keep up with my last porter, who was carrying perhaps fifty pounds upon his back. I soon abandoned the attempt, however; and away went guides, porters, and baggage up the mountain, and would soon have been lost to

sight, had it not occurred to some of them that perhaps, after all, it would be just as well to keep the foreigners in view. I have had many experiences with Indian porters since then, but their climbing capacity never ceases to fill me with amazement.

Having abandoned all attempts to keep up, our own party found that we were pretty well matched, and pretty fair climbers as white men go. But the trail was sandy and very steep, and the mountain side quite similar in structure to an ordinary railroad embankment. We had climbed to one thousand feet above where we had left our mules, and were now 16,000 feet above the sea, or three hundred feet higher than the summit of Mont Blanc. We kept along at a pretty fair pace, though we found climbing railroad embankments at that altitude rather wearisome. We began to notice now with regret that one of our party was slackening his pace a little. The farther we went the worse he became. Six hundred feet higher, and he gave it up entirely; mountain sickness was upon him in full force. The summit was evidently not for him. One of the others got out a small bottle of concentrated ammonia-water, hoping to relieve him. Forgetting the natural consequences at such an altitude, he removed the stopper somewhat carelessly, and the contents immediately exploded, blowing the strong alkali into his face and eyes. Luckily for him plenty of water had been brought in our canteens, and had not been given to the Indians to carry. Its immediate application perhaps saved our companion's eyesight. The pain was nevertheless intense, and lasted for some hours. Thus we found that the dangers of high altitudes were not confined alone to the natural obstacles in our path. Calling back one of the Indians, we left our mountain-sick friend with him, while the rest of us, having partaken of a rather light breakfast, proceeded on our journey.

The slope now grew steeper, and extremely fatiguing. Later we climbed over broken lava, which was only a little less difficult than the loose sand. Perhaps owing to the twenty-five mile ride of the day before, and to the lack of sleep on the previous night, I was not in so good condition



EL MISTI, FROM THE AREQUIPA OBSERVATORY.

From a photograph by William H. Pickering.

for climbing as usual, but certainly it seemed to me that I had never undertaken such a difficult ascent before. We were now at an altitude of a little less than 18,000 feet, and I found I could only advance one or two hundred feet at a time, before I had to sit down to rest, and perhaps fall asleep. On awakening I would make another advance. In this way I found progress very slow. Towards the end, as the air pressure became less and less, I had to take my rests more frequently. At the very last it became necessary to cross a slope of loose sand and scorix, and I found it best to reduce my rests to a system. Accordingly I would take two steps, stop to breathe twice, then take two steps more, and so on. By this method I got on much faster than by trying to go farther with longer stops. The two others reached the camping-place, at an altitude of 18,440 feet, in rather better condition than myself, but we were all thankful to crawl into our sleeping-bags without spending much time upon our dinners. Our shelter was merely an overhanging shelf of rock; but it was all that we needed, as the night was not very cold. We all of us had severe headaches, and felt on the verge of nausea, and I myself had frequent attacks of gasping for breath. Under these circumstances I would lie on my back, open my mouth, and breathe like a fish out of water. It was certainly a very disagreeable sensation, for we seemed to be so helpless, knowing, as we did, that we had all the air that there was to be had. In the course of an hour or two my difficulties passed off, and I fell asleep. The two others, however, were less fortunate, and lay awake most of the night. The result was that when morning came I awoke refreshed and ready for another climb, whilst the others felt less actively disposed. Two of us, however, started shortly after breakfast for the rim of the crater, which we reached in about twenty minutes. The crater itself is double, the centre of volcanic energy having shifted, so that the new crater, which is circular, has impinged upon the old one, leaving it crescent-shaped. The bottom of the new one is perfectly level, and covered with sulphur, while from numerous vent-holes jets of steam are constantly arising. It is several hundred feet in depth, and perhaps one

third of a mile in diameter at the rim. The walls are extremely steep, and in some places nearly vertical.

As my companion did not feel inclined to proceed farther, I got a couple of Indians to carry my apparatus and guide me around the edge of the crater to a point upon the opposite side, which is the true summit of the mountain. We travelled for about a mile, most of the way over snow, but occasionally crawling around precipices and over rocky ledges. When I reached the summit, I was glad to lie flat on my back for ten minutes to recover myself. I then read the barometer, which stood at 15.012 inches, while the thermometer registered 54°. I next tried my pulse, which, contrary to my experience at lower elevations, was very faint, but registered 100. My breathing was 25. At Arequipa my pulse was 68, and my breathing 14. At sea-level both figures are usually somewhat higher.¹

To avoid sunburn and snow-blindness my face had been coated with vaseline, and my eyes protected by dark spectacles and a blue veil; yet no sooner had I reached the summit than my eyes were attacked by a most painful smarting sensation, which rendered all observations entirely out of the question while it lasted, and only yielded to a prolonged rubbing with melting snow.

After securing a number of angles with the micrometer-level, we started upon our return at 12.45. But the sun had now softened the snow, so that we occasionally sank in it nearly to our hips. My Indian guides, according to their custom, had gone ahead with the baggage, leaving me to find my way down alone, as best I could. Fortunately I had their footprints to guide me, so that there was no danger of losing the trail. To be alone in such a place and at such an altitude must always be very impressive to the traveller, no matter what his temperament; and, on the whole, I was very glad that my guides had gone. The deep snow made the return trip around the crater very fatiguing, for at no

¹ I have sometimes been asked how the sky appears at these great altitudes. It looks darker than at sea-level, but still not so much so as one might at first suppose. The story that the stars are visible in the daytime from high mountain summits is entirely unwarranted by the facts.

time were we at a less elevation than 19,000 feet above the sea. On returning to the camp I found a note from my companions, stating that they had started for home; so I also at once began the descent.

If the mountain was hard to climb, it was certainly one of the easiest of descent that I have ever known. The motion was almost like skating, the loose stones rattling and sliding after one, and the finer particles following in a cloud of dust. Each step was between one and two yards in length, and I reached the base of the cone from the edge of the crater inside of fifty minutes. The *tambo* was reached half an hour later, and I had descended over 5,000 feet inside of one hour. That night we passed at the *tambo*, and the next day returned to Arequipa, none the worse for our adventures.

As the subject of mountain sickness seems to be attracting much attention at the present time, some further results of our experience in this region may be found interesting. In 1892 we established a camp upon Mt. Chachani, at an altitude of 16,600 feet. Here we had a stone hut built with a bridle-path leading to it. Many persons visited this camp in company with myself or my assistants, and thus we had an opportunity to witness many phases of the complaint. The commonest symptom was a severe headache, with a disinclination to move about. This was sometimes accompanied by nausea, and in one instance by a temporary loss of memory. I remember a case which occurred upon Pike's Peak, where the victim became temporarily delirious; but this I think is very unusual. The sickness seems to be brought on by hard work, or by eating a hearty meal. At these altitudes one seldom feels very hungry, and a dinner consisting of a little broth and some fruit is all that is needed, and seems to be all that one can digest. Meat should in general be avoided. It sometimes happened that a visitor would feel remarkably well on arriving at the camp, would walk around briskly, laugh at mountain sickness, perhaps smoke a cigarette, eat a hearty dinner, and inside of fifteen minutes would be stretched out flat on his back. Our expe-

rience was that if one felt uncommonly well and lively, this of itself was a symptom of the complaint. Recovery was sometimes rapid, but usually the case went from bad to worse, especially as night approached. The following morning the sufferers would usually feel better. We found that all persons with blood of the white races in their veins were subject to the complaint, the pure-blooded Indians only being more or less exempt. Half-breeds who had spent all their lives in Arequipa were often more susceptible to it than ourselves.

In my own case this susceptibility rapidly wore off, and after my first night on the Misti I never again felt any very serious inconvenience. Shortly before my return to the United States I made an attempt to ascend Chachani; and had it not been for an accident to a member of our party, we should probably have succeeded in our attempt. As it was, I reached an altitude of about 19,000 feet without any premonitions of mountain sickness. One of my assistants, on the other hand, thought that the tendency to the complaint increased with the length of his stay in Arequipa. Although more or less like sea-sickness in its symptoms, immunity from the one by no means promises freedom from the other.

Three Days on the Zinal Grat.

BY PHILIP STANLEY ABBOT.

Read November 27, 1898.

ZERMATT lies in a hollow between three of the loftiest ranges in the Alps. To the southward, separating it from Italy, is the main or Pennine chain; and on the east and west, running northward toward the Rhone from Monte Rosa and the Matterhorn respectively, are two great spurs, the one culminating in the Mischabelhoerner and the Nadelgrat, the other, the Zinal Grat so called, in the Weisshorn. The former, it may be, averages a little better in height. The Zinal Grat, however, because of its greater boldness is unquestionably



ILLAMPU (THE HIGHEST OF THE ANDES), AND THE SORATA RANGE, SEEN OVER LAKE TITICACA.

From a photograph by William H. Pickering.

the favorite among climbers. Though all of the peaks were conquered many years ago, they have not wholly lost their dignity, but an unusual number of them still rank as "first rate." Beginning with the Weisshorn and running south, there comes first the Moming Pass (to mention only the more noted expeditions), then the Rothhorn, and then the Trift Pass and the Wellenkuppe, the most delightful of all "Probestücks." The crest then bends westward for half a mile, to rise again in the Gabelhorn, of which indeed the Wellenkuppe is little more than a satellite. Here the range seems to end, or rather to divide;—one spur runs eastward at right angles toward the valley, throwing up as its outpost the Untergabelhorn, directly underneath which lies Zermatt; the other spur—which, though rather low, is really the continuation of the range proper—turns due west to culminate in the Dent Blanche. Facing the Gabelhorn on the south, and separated from it by the deep trough of the Zmutt Gletscher, is the Matterhorn. Throughout rocks preponderate over snow,—firm rocks for the most part, delightfully sculptured,—in consequence of which fact there is not a dull climb to be found from one end of the Grat to the other.

My plan, on the afternoon of Aug. 15, 1892, was to go up to the Trift hut by the ravine immediately behind the Monte Rosa Hotel, and sleep there; to cross the Rothhorn on the 16th and descend to the Mountet hut in the Durand basin on the western side; to recross the next morning by the Trift Pass; and on the 18th, working still farther southward, to attempt the Gabelhorn. I wish my experience might lead some other members of the club to try the same trip. Both the climbing and the views are glorious; and—if anything in the neighborhood of a place so hackneyed as Zermatt can be said to be off the beaten track—I suspect the descent of the Rothhorn by the northern arête may almost claim that distinction.

At all events, one bit of that descent—the great gendarme—is incomparably the finest short piece of climbing I ever imagined. Taking all four mountains in good weather, neither the Matterhorn nor the Weisshorn nor the Gabelhorn, so far as the ordinary routes are concerned, have anything to

approach it. The two guides and myself consumed almost two hours in letting ourselves down a hundred and fifty feet; and for once in my life, and only once, I enjoyed the sensation of seeing Peter reduced to the level of demanding constant support even from the hands of his "Herr." Whichever one of us was moving, the other two stood still and braced themselves, on the keen alert to check a slip, the one above drawing the rope taut and paying it out inch by inch. Any one who has climbed in Switzerland knows that this implies a good deal; for no matter how genial your guide may be, there is a point to which he never extends the golden rule. The mere suggestion of being hung up by the middle after the manner in which he so often and so unnecessarily suspends his employer, fills him with execration.¹

The Rothhorn, however, has already appeared once in APPALACHIA. The reader may therefore imagine us to have finally reached the foot of the gendarme—to have passed over a further portion of the northern ridge, on which the *foot* of man is said never to have rested—to have left the main crest and turned westward on a side spur running toward Lo Besso, spending a rather breathless hour on the sharpest snow arête I ever saw, more knifelike even than that of the Weisshorn, though perhaps not so steep,—then to have dropped down from our perch, which at least was cool, into the swells and hollows of the upper névé of the Durand basin, where the sun blazed and beat down on us through the motionless air, and we plunged knee deep through melting snow that seemed white hot with its glare, the lanoline rolling in streams off our red faces;—and at last, after twelve hours, with a whoop and a final glissade, we can be supposed to have reached solid ground, and, in a few moments more, the hut.

It is curious that the cessation of what one has voluntarily sought should be the point of keenest pleasure during the

¹ Of course I do not really mean that a guide—unless especially requested—does more than hold the rope taut. He never professes to support a pound of weight. But when conditions are reversed, even this infuriates him. Readers of the Badminton volume on mountaineering will remember the delicious picture entitled "On the Tit-für-tat berg."

entire day. Certainly, however, there are few sensations in life equal to that of pulling off snow-glasses and gaiters, mopping the lanoline off one's cheeks and nose, disentangling one's self from the rope, and becoming once more a free and independent unit in society. And in the relaxation of mood that comes later still, after dry stockings and a meal, one needs very little indeed of either society or creature comforts to be happy.

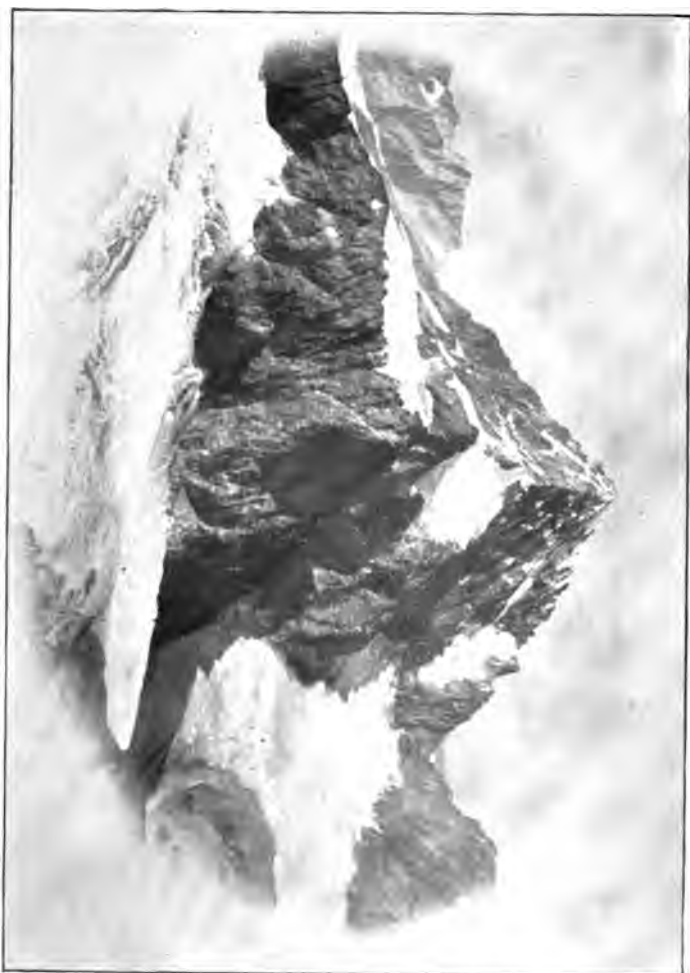
Creature comforts, at all events, were not plenty at the Mountet hut. The sleeping accommodations were good enough except for fleas; you clambered up a ladder, and in a sort of loft discovered a broad and shallow trough filled with hay, on which you curled yourself in a blanket. But the food—! After I had changed my shoes and stockings, and parboiled my face in hot water to allay the burning and soak off the lanoline, the custodian of the hut came forward politely,—"What would Monsieur require for dinner?" I told him, eggs to begin with. He was "desolated to inform Monsieur that all the eggs had very recently become uneatable." I asked him what he could supply, then; he responded, soup, meat, and coffee. I ordered the entire menu. The coffee was at least unadulterated, being chicory. Ravenous as I was, however, the meat was beyond me; I judged by inference that it was the flesh of an old he-goat. As for the soup, which seemed to be an infusion of the same animal, it was just bearable,—partly because of necessity, but chiefly by reason of the faintness of any savor whatever.

It would have taken greater hardships than these, however, to disturb my serenity half an hour later, as I lay in the sun on the warm rocks outside, and watched the shadows creep over the snow, and contemplated our defeated antagonist of the morning, which rose immediately above us on the left, each familiar gap and pinnacle on the northern ridge illuminated by the western sun. Following the Zinal Grat southward from the Rothhorn, and passing by the graceful outline of the little Trifhorn, one's attention was next arrested by a deep notch, at a point where the range seemed to fall away toward us almost sheer, at all events in slopes much too steep for snow to find lodgement. This notch was the Trift Pass,

our objective point the next morning. Among the legends picked up by the early generation of climbers was one to the effect that this was a pass of very great antiquity, having been used centuries ago by the shepherds, in taking their flocks from one valley to another. The story is a pretty one, — but, as I let my eye wander over the series of absolute precipices (or what looked like such) below the notch, the conclusion seemed irresistible that the mediæval cow possessed the skipping powers of a flea. Beyond the Trift Pass was the Wellenkuppe, and beyond that, the statuesque outlines of the Gabelhorn, as snowy on this side as it is rough and craggy on the other, but not less steep. After that the range sinks to form the Col Durand, and then rises again in the tremendous cliffs of the Dent Blanche, which from the climber's point is on the whole the king of the Zermatt peaks.

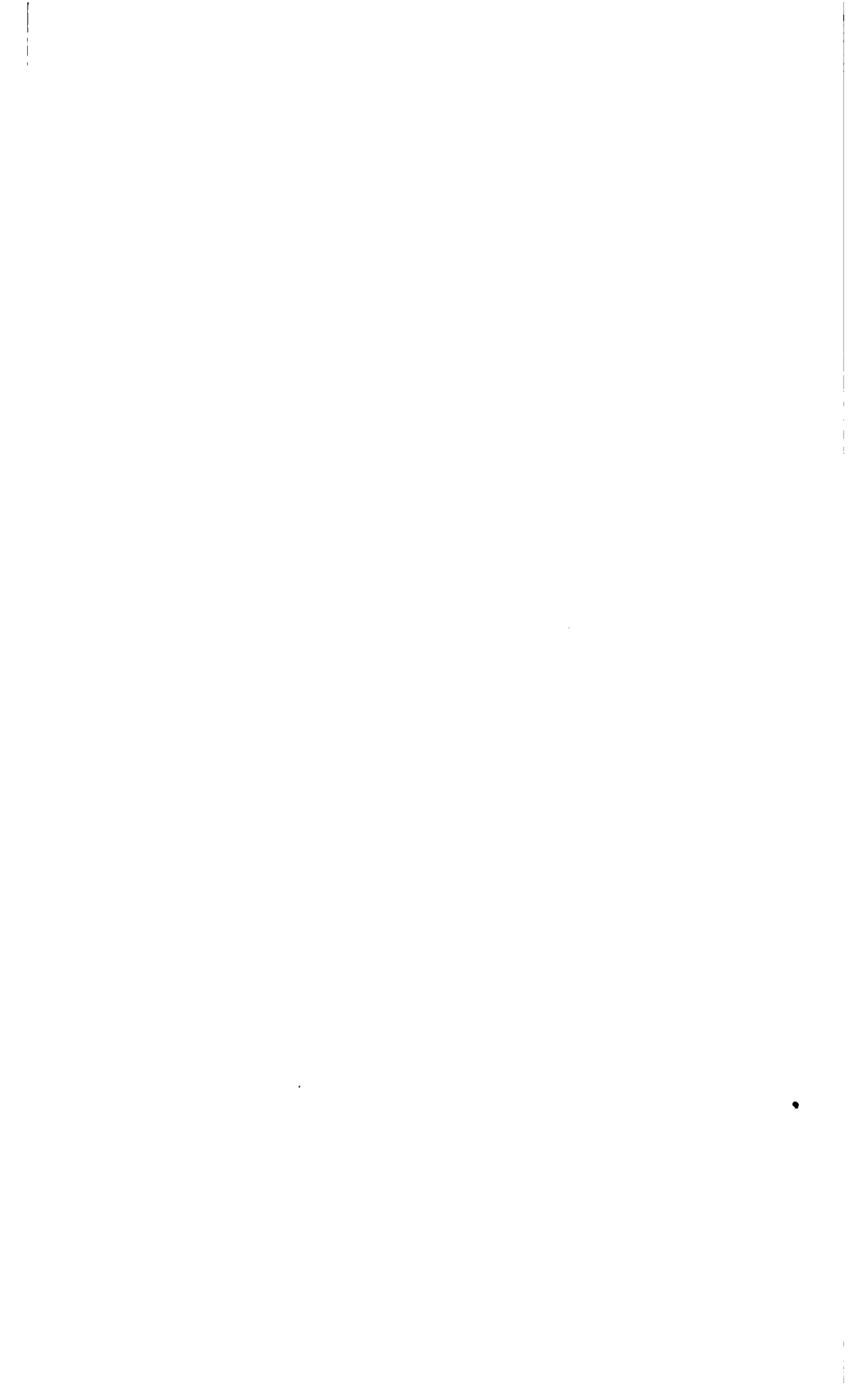
I often think of that wonderful amphitheatre when I am trying to get into the proper frame of mind for sleep. There are other similar views, — to name the most familiar example, that from the Gorner Grat, — on a far more splendid scale ; but I do not know of any other quite so perfect in its simplicity. There is nothing to mar the effect ; absolutely no break in the whole jagged circle of the horizon, except the snow passes directly opposite, on either side of the Dent Blanche, — themselves more than eleven thousand feet above the sea. The shelf of Lo Besso, on which the hut stands, is here and there half tinged with green by scattered tufts of herbage growing between the stones. Otherwise there is not even a sign of vegetation, nothing but the moraine-streaked ice beneath, then the pure white of the *névé*, and then bare rock ; and the only suggestion of the existence of a world of living beings beyond, is a single deep gap in the mountain wall, through which the Durand Glacier, sweeping around the foot of Lo Besso, hundreds of feet below you, disappears. It is a spot in which one can wake up at night and really feel alone with the stars.

Peter was merciful the next morning, inasmuch as the day's work was to be merely an interlude. It was five o'clock — broad daylight — before we had dropped down to the glacier and were fairly off, the rough ice underfoot crunching pleas-



DENT BLANCHE.

From a photograph by Vittorio Sella.



antly as our nails bit into it. The first half-hour was delightful. The freshness in the air was enough to make one's eyes dance in one's head. We gained fast, both in altitude and in distance, and the wall of rocks grew steadily nearer. I must confess, however, that as I scanned its thousand feet of precipice, and tried to imagine where our own path lay, I felt once more that the cattle which used to cross the Trift Pass did well to live in an "age of faith." A cow of that breed, taken out to water in a New England barnyard, would be apt to jump over the head of the hired man, make the eaves at another leap, and graze along the ridgepole.

Presently Peter turned to the right, in a direction more nearly parallel to the foot of the cliffs, and made for a tongue of snow which apparently reached high up on the wall of rock, and in reality also stretched back into a recess which now for the first time became evident, — a sort of broad couloir, filled with avalanche snow. The queerly contorted greenish strata of the Trifthorn were immediately above us. It was clear at once that the couloir was going to be steep; and as the snow, packed close by its fall of a thousand feet or so, lent itself about as kindly to kicking footsteps as though it had been ice, I supposed Peter would slow up. Not he! When I began to slip, he simply put the slack of the rope over his shoulder and tackled the slope, whose pitch was about that of a roof, at a somewhat quickened pace. By the force of circumstances I followed, slipping, puffing, clawing with the pick of my ice axe, and pulling myself up as best I could, hot and red with anger. Protest was impossible, because I had no breath. If I had fallen, the moments before I reached the bottom would have been rendered sweet by the thought that I was dragging Peter with me. At least, I felt so for a few exhausting minutes, until his justification appeared. As the gully became narrower, the snow seemed to be sprinkled with chips of green rock; and presently, as we approached nearer to the wall, we came upon a danger signal yet more striking, — a channel six feet deep and as many wide, worn out and kept smooth by the constant fire of débris from above. Early as it was, a dozen pieces went skipping by while we looked. For some reason, the whole Zinal Grat changes its character

for a short distance on either side of the Trift, and instead of firm rock like both the Rothhorn and the Gabelhorn, is friable. In the first hours of the day there is little danger ; but if the pass is taken in the reverse direction, its reputation for throwing stones at the traveller is very bad indeed. Considering how hackneyed the expedition is, it is rather surprising that no serious accident from this cause should ever have been recorded.

Under these conditions the Trift is naturally not an attractive piece of rock work. Hand-holds ought to be like Cæsar's wife ; there is no pleasure if they are liable, when tested, to clatter down a thousand feet into the jaws of a crevasse. Apart from this, however, and from the despicably ill-swept condition of the ledges, the climb is not a bad one, and is far easier than it looks from below. We reached the top, which is 11,614 feet above the sea, and 2,200 feet above the hut, in only two hours and ten minutes from the start. It was evident at a glance that our patience was not to be further tried ; for the *névé* lies almost a thousand feet higher on the eastern side than on the western — it was a matter of ten minutes to reach it.

We stayed at the top almost an hour, in order to finish our second breakfast ; a delay due not so much to the quantity as to the quality of the provision furnished by the Mountet hut. I had had bread before that was *difficult* to bite, but never before this a piece from which it was impossible, either with molars, canines, or incisors, to break off a mouthful, — never but once. Perhaps a horse might have managed it unaided ; for my own part I gave it up, and used a sharp pen-knife to cut out the mouthfuls, which I ground to pieces afterward with my back teeth. I have often wondered when that bread was baked. It reminded me of a loaf which I once tried to dispose of after it had been forgotten for six months in my college room.

It was still so early when we reached the *névé* of the Trift Glacier that only a thin upper layer of the snow had melted, and instead of plunging up to our knees as is usual in descending, we could almost run, with long sliding steps. In much less than an hour we reached the top of the Rothhorn moraine,

with our old friend the Trift hut in plain view. We skipped down the moraine like goats, Peter and all; one thought, though unexpressed, was in all our minds,—the flesh pots. I was also moved by the sight of a little glacier lake, suggesting irresistibly the possibility of a bath, an idea at which both Peter and Lager hooted. I persevered, of course, and it was probably worth while on the score of self respect. But I wish the proprietor of some establishment for cooling drinks might utilize that lake.

The rest of the day was devoted to recuperation, with an earnestness proportioned to the previous abstinence. Perhaps one episode is worth throwing in, to show the lengths to which a Swiss appetite can carry one,—not, I hope, as characteristic in general. About three hours after lunch, hearing a noise, I went down stairs and found a young Englishman, who had just returned from the Rothhorn, sitting at table with a tureen of soup before him. As I came in, I noticed that he pushed back his plate with the air of one who had had enough. An inspiration seized me; I dropped into a chair, and under pretence of reading, kept one eye on the tureen. Presently the girl entered to remove it. Then I got up and said, with apparent hesitation, “I beg your pardon, Sir, but are you not going to finish your soup?” As he was only a cockney he did not grow rigid, but answered civilly enough, though a trifle nonplussed, that he was not. “Then,” said I, “if you have no objection, I will;” and I did, every drop. This interlude did not interfere with a hearty dinner two hours later; nor, for that matter, with the most profound and dreamless sleep immediately after. The hut was full that night, and everybody in it—four parties beside ourselves—was bound for the Gabelhorn. I believe it was a number quite unprecedented in the history of the mountain. Consequently Peter’s programme embraced a very early start, with a view to giving the rest the slip.

When he pulled me out of bed, before one, I could n’t help realizing that after another such night, life would become a burden. It was a consolation, however, to feel that the others were equally miserable, and were distanced beside. Precisely at half-past one we lighted our so-called lantern, —

for, gloriously bright as the stars were, they were not enough to climb by, — and stepped out into the night air.

The moment I felt the breeze, I knew there was something wrong. The crispness, the touch of frost that usually wakes one up, was gone ; the air, even at that altitude, was languid. Under perfect conditions, the light currents that wander down from the snow fields are so gentle and steady that they make part of the peacefulness of the night. This time there came sudden puffs of wind that blew warm on our faces. It was evident that something was brewing. As yet, however, the sky was clear.

The first part of the path we felt familiar with, having passed over it on a previous trip to the Wellenkuppe ; so that I was confident of making good time at the outset. I knew, of course, that in order to reach the moraine alongside the Gabelhorn Glacier, it was necessary to cross the stream flowing from the Trift Glacier. What I forgot was, that in the Alps it is good weather that is dangerous ; the brighter the sky, the more uninterruptedly the sun pours down its heat, withering the lower patches of snow and causing even the ice of the glaciers to rot. Only the afternoon before, a stream on the other side of the valley had been swelled beyond its bounds, and had undermined and carried down bodily a whole moraine, — an avalanche of thousands of tons of muddy gravel, which had made an irreclaimable waste of acres upon acres of cultivated fields. Compared with this, our ill luck was certainly trivial enough ; it was merely that when we reached the stepping-stones, we found a torrent of dirty water boiling over them. Peter looked disgusted, however ; it is out of the question to wet one's feet at the beginning of a climb, with the certainty of spending several hours thereafter at an altitude where the air itself is always below freezing, and with the added possibility of a change in the weather ; and he guessed the character of the detour we should have to make. There was nothing for it but to keep up the wrong side of the stream until we could cross it by piece-meal under the very snout of the Trift Glacier. This involved stumbling across the terminal moraine of the latter from side to side and crossing two or three of its lateral moraines, before we could

reach our proper pathway, which was the moraine of the Gabelhorn Glacier.

The terminal stuff was disagreeable enough, consisting as it did of big loose stones, dumped six deep by the retreating ice just as they happened to fall. This was paradise, however, compared with clawing one's way up an undigested lateral moraine in the dark. A moraine is meant to walk along, not across. It may be described, if put to its legitimate use, as a steep ridge of compacted mud and rock, from twenty to a hundred feet high, and perhaps six inches wide at the top. Along this top you grope your way, much as a cat walks the ridge-pole of the roof; you see nothing on either side but gross darkness, and you trust to Providence for the stability of your foothold. Still, as the top never does break away, one finally gains a certain degree of equanimity. Now imagine yourself, however, to be climbing up the slates, — you not being a cat, the pitch of the roof being excessive, and your footing being crumbly. The mud is far too solid to kick steps in, and there is, of course, no hand-hold. If you ever reach the top, you know you must immediately go down the other side, and when you have landed at the bottom again, you will be nearer your goal by perhaps a hundred feet — no more. The worst of it all is that your guide is callously unsympathetic in such places. He improvises a series of perfunctory little sloping gashes with his ice axe, each one perhaps a third as wide as your boot, and disappears up this stairway at an ordinary walking-pace, leaving you to follow as you can, you being as yet unroped. You may make a third leg of your ice axe if you wish, and you can also take comfort in reflecting that a slip will probably do nothing worse than land you at the bottom with your face skinned and your clothes in a wad around your neck. I must confess that even this never happened to me; but I can also say honestly that I cannot understand even now why it did not. Hour for hour I would far rather spend my time on the Rothhorn arête. Peter used to grin unfeelingly when I told him so.

Somehow or other, at last, we did find ourselves on the top of the right moraine, and were relieved to see all the other lanterns still twinkling below us. But the day was dawning

before we got upon the lower névé of the glacier and roped ourselves. That morning even the snow played a trick on us. As a general rule, however hot the day may have been, there is frost enough in the night air not only to harden the snow, but to make the surface crisp, so that one's nails bite. On this particular morning the lower layers were compact, and the top layer was positively slimy. Whenever we stepped out freely, our boots slipped. This continued until the point where the route up the Wellenkuppe turns up the wall of rocks to the right; which is also the point where the real, and indeed the greatest interest of the Gabelhorn begins. Though the final rocks are exceedingly respectable, and offer perhaps the longest climb of continuous steepness attainable near Zermatt by an ordinary individual, the glacier work of the early part of the expedition is a greater attraction still.

Mention has already been made¹ of the fact that at the Wellenkuppe the main crest of the Zinal Grat bends quite sharply toward the west, and that the Gabelhorn itself sends off an eastward spur toward the valley, ending in the Unter-gabelhorn. This spur, and the main range between the Wellenkuppe and the Gabelhorn, are almost parallel. In consequence, the latter mountain, as approached from the Vispthal, lies at the head of a deep and narrow recess, filled by the Gabelhorn Glacier, and enclosed between high walls. It was up this glacier that our path now lay. The morning broke as gloriously as any I ever saw; and certainly nothing could be more gloriously beautiful than the foreground over which we turned to watch it, — the untrodden névé, sinking toward the valley in great rounded swells and hollows of soft white, here and there crossed by the shadowy line of a crevasse. Everything below us was hidden; the first thing visible beyond the snow of our own glacier was the dark outline of the peaks of the Saas Grat on the eastern horizon, and behind them the sky, its first clear green and orange already beginning to deepen into blue with a flush of rose.

For a while after roping we kept close to the cliffs of the Wellenkuppe on our left, where the avalanche snow of the preceding spring had choked the crevasses and left us free

¹ See page 213..

passage. Our objective point at the head of the glacier, however — the foot of a certain rib which runs down from near the summit of the final peak — lay well toward its other or southern side; so that it became necessary very soon to veer off toward the right and commit ourselves to the middle of the glacier, in spite of the inevitable network of crevasses. It is this necessity which makes the Gabelhorn more or less of a lottery; for the crevasses in the steeply inclined upper *névé* have very little resemblance to the parallel gashes which cross the same glacier lower down; they are perhaps fewer in number, but oftentimes instead of cracks they are veritable gulfs, yawning open twenty, thirty, or even forty feet. Though lying in general at right angles to the line of flow of the ice, they are not apt to extend the whole way across,¹ so that by dodging from side to side one can get around the end of many a blue chasm which would be impassable otherwise. If this expedient fails, and the crevasse is too wide to jump, there is usually but one other resource, — a snow bridge. These latter contribute doubly to the excitement of glacier travelling. Such as are perfect, concealing the very existence of the crevasse, are pitfalls to the unwary to so great an extent as to make it positively criminal to travel over *névé* unroped. Where the opening is too broad for this, so that only a bridge survives into the middle of the summer, the excitement of the game is not diminished by the fact that one has fair warning. It is in such places that one's true relation to one's guide comes out. On most rocks you may have your own opinion. But whether a frail arch of snow, suspended over an abyss whose bottom is lost in darkness, will bear you, is a different kind of question; and it is too much like gambling for one's life to decide on anything but certainty. Fortunately the instinct developed in a good guide after years of training must practically amount to certainty, for scarcely a recorded accident has occurred in such places to a party which was under proper leadership. Nevertheless, no matter how firmly one clings to this conviction, one is apt to get exceedingly

¹ Some idea of the way crevasses lie, one petering out and another beginning just behind it, may be obtained by trying to break a tough willow stick. The difference is that in the glacier the fissures are transverse.

good practice in the art of faith before one finishes even such a labyrinth of crevasses as those we were approaching.

For the first hour we went on swimmingly. We had the half obliterated footsteps of former parties to profit by. The snow at this altitude was crisp enough. The heaviness had left the air, and with it all immediate fear of a storm. The wind, instead of dying out as usual, had risen, and was blustering down from the summit in gusts that made our veins tingle. It was too early for the commonplace glare of full daylight; the shadow still lay half-way up the mountains. Beautiful as the views were, however, we did not stop much to enjoy them — as is rather apt to happen in the rush of new vitality that comes with the first rays of the sun. Besides, the work was full of interest, changing every moment. The glacier was far from a mere snow field. Except for the dazzling white, its undulations suggested a rolling Western prairie. Our path wound to and fro, now twisting around a huge hummock, now taking another in full front at a breathless pitch, — for we were rising fast, — now slipping through between the ends of two crevasses, and now shuffling cautiously over a bridge of snow with the rope kept scrupulously taut. We had kept well ahead; one party, of Germans, were a hundred yards behind, and the two English parties were mere specks in the white distance.

Presently Peter came to a sudden stop. The track we were following had led us into a cul de sac; for the snow bridge which our predecessors had crossed had become obviously rotten, — the crevasse was a big fellow, — and to retreat meant a detour which would give the Germans not only the lead (they had profited by our mistake in time and secured that already) but a hopeless one. There was one other possible manœuvre. Close at our right the crevasse narrowed as it joined another one behind us; and from the promontory formed by this junction there appeared to be a practicable bridge. But this bridge started from a level ten feet below us, being the continuation of a narrow shelf running along the edge of the crevasse for some distance. If we jumped on the bridge we should go straight through to the bowels of the glacier, and if we tried to jump on the shelf

we should reach the same destination by pitching forward. Thereupon Peter calmly proceeded to walk down to the shelf along the side of a perpendicular bank of snow, cutting half a dozen steps on the way. I had to follow next. With a rope tied around my middle, and Lagger above holding it, I suppose I was safe, and in fact he did not have to fish me up; but I hope I may never repeat the sensation of being inside the edge of a bottomless pit, with nothing on earth to hold by, and my centre of gravity beyond the falling point. I don't to this day see how one of those steps was possible.

Once down, we got across the bridge easily enough, and fell in behind the Germans. Crevasses of the largest size were less frequent after this. The slope grew rapidly steeper; and in half an hour we were all standing on the under lip of the bergschrund, the final and inevitable moat which surrounds the base of every peak, and which not seldom guards it effectually from attack. Indeed, we had come none too soon for the one before us, for Peter doubted whether it would last another day. The upper lip projected, and between this and the bridge—if the mass of rotten snow on which we stood was really a bridge—there intervened a perpendicular gap through which we got a suggestive glimpse of translucent blue vanishing into darkness. A high step was impossible, and there was no apparent brace by which to scramble up. Finally one of the guides managed to drive in his axe above, and to get his knee on the edge of the upper lip. Peter applied the flat of his own axe behind and shoved—the man pulled—and up he floundered somehow. After that it was easy for the rest to follow. In five minutes more we had reached a breakfast place on the rocks of the final peak, and for the first time sat down, with the music of the wind to eat by.

The structure of the Gabelhorn is rather complicated, and it has been ascended in many ways all of nearly equal difficulty,—by all four of its arêtes, by the south face, and by the route which, though last discovered, has now become the usual one from Zermatt and which we were about to try,—the eastern face. The plan of attack was exceedingly simple. From a secondary summit, perhaps two hundred feet southeast of the main one, a rib runs down to the point where we had left

the glacier; our way lay straight up this rib until within a very short distance of the summit, — a thousand feet of as continuous climbing as can be found anywhere. The average slope of the rib is probably between 60° and 70° , and I do not remember a place on it where two people could have sat down comfortably to lunch.

Here was a situation where it really paid to be first; for no matter how great your admiration for Smith may be, you cannot in human nature help putting more faith in your ability to keep from throwing down rocks on him than in his ability to take care of you. Consequently we cut our breakfast short and got away before the Germans. There are no preliminaries on the Gabelhorn, but the work begins at once, — solid work, of the kind where one takes off snow glasses and settles down to a steady pull and heave and tug, keeping on until the perspiration streams down into one's eyes, although the atmosphere is freezing. There are no places so spectacular as the Rothhorn gendarme, — though I remember vividly one shallow chimney where to my lasting mortification I had to give in and pull myself up by the rope. But if there is little occasion for the pyrotechnics of mountaineering, there are also very few moments when one can afford to do less than climb one's hardest. Even on the Matterhorn one's arms get scarcely so great a proportion of sheer lifting. Leaving out of consideration the question of altitude as bearing on mountain sickness, a man who can do the Gabelhorn rib without puffing has tested his wind and strength, to say the least, for any ordinary expedition around Zermatt.

We had one especial piece of good fortune in the wind. It had gone on increasing all the while we were on the névé, until by the time we reached the rocks, it was blowing half a gale. As it came from the westward we did not feel its full force so long as we kept to the rib, but caught only an occasional puff that beat our caps about our ears. We could hear it, however, long before it struck us, whistling and singing over the summit rocks as though the whole upper air was alive. And when we swung around, first to the southern and then to the western side of the lower peak, a few yards below the top, and it did have a chance at us, there were times when we

cowered down in any crevice we could find, shaken and half deafened and for the moment not daring to move. On a day when the air was sharper, the cold would have been intolerable,—it was piercing enough as it was,—and indeed Peter afterwards admitted that if the gale had risen even a little he would have turned back as one of the other parties did. It was glorious, however. There is something immensely exhilarating in wind at any time; but when one is clinging to the face of a cliff, holding on in spite of its buffets and defying it in its very eyry, the effect on one's spirits is like intoxication. One wants to shout.

Watching our chances, we wound our way up carefully, for the rocks just below the lower summit were particularly steep, until we could see the short arête which runs across to the summit proper. A good deal depended on its condition, for in certain states of the snow it is impassable. Here again fortune favored us; instead of soft snow,—or ice, which would have been almost equally fatal, since step-cutting in the face of such a wind would have been too precarious,—the rocks were bare, except for a skeleton ridge of ice, a mere parapet, to show what there had been. We crouched down and half crept, half ran across, climbed a few feet of easy rocks, and then crawled up a sloping bank of snow. This was the summit,—13,320 feet above sea level.

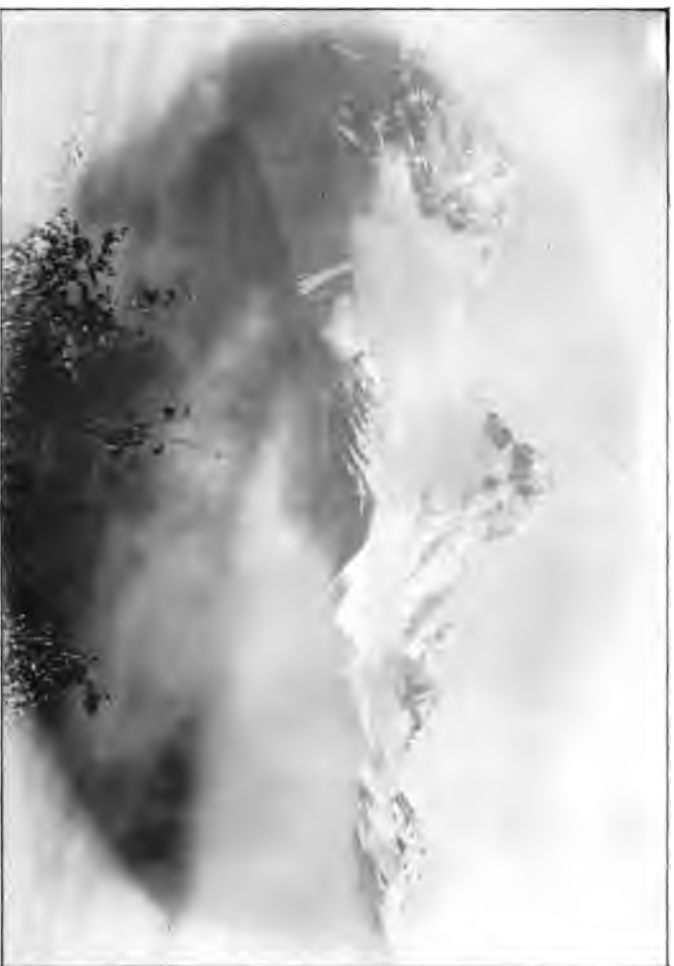
The view toward the Matterhorn and the Dent Blanche, in regard to both of which the Gabelhorn has a position of peculiar advantage, must have been very fine, but I do not remember either. It is shivery work, sitting on snow two miles and a half up in the air at half-past seven in the morning, in the shade and with a gale of wind howling about one's ears. Moreover the top is no place to walk about. More than once the cornice has given way, and persons standing on it have been saved almost by a miracle.¹

Under the circumstances, and with the thought of the

¹ Once—this was on the connecting arête over which we passed—young Christian Almer, son of the famous guide of that name, was standing on the very crest when he saw the snow beginning to crack under those in front. Before they had had time to fall half the length of the rope, he had thrown himself over on the other side, the two jerks had counteracted each other, and the party was saved.

bergschrund in our minds, we very soon turned and fled, remembering also that the eastern sun lay on the rib, and that the rocks there were probably warm enough to thaw our fingers. Genial as the warmth was, however, we did not stop to bask in it; for this time the Germans were behind us, and the longer we delayed in the descent, the longer we should be in line of fire. The bergschrund did not justify our forebodings. I will not venture to say how largely this was due to the fact that on the other side of it lay something more substantial than the mere summit of a mountain, namely, the creature comforts of which we had been deprived for three days, — something to eat and drink at the Trift hut, and beyond that, at the Riffelalp, a bath, a dinner of not three but seven courses, a real bed, and twelve solid hours to stay in it. Our time from the bergschrund to the Trift was unquestionably good, and from the Trift to Zermatt still better. It is absurd now to realize how simple one's ideas of happiness can become under certain circumstances.

Within thirty-six hours, the weather finally broke. As we tramped up and down the glass covered piazza at the Riffelalp, and caught momentary glimpses of the mass of seething cloud that obliterated the Zinal Grat, it gave us a curious feeling to realize what it would mean at that moment to be caught where we had been basking in the sun a few hours before. After all, this is the fascination of the Alps. Even vulgarized as they seem so often to have become, they are not really subdued and never will be. They have too many moods in which one had better not profane their solitudes if he values his life. One never forgets this; and so one never loses a certain sense of awe in regard to them. As in any really noble effort, one could spend a lifetime in learning to understand the mountains and to climb. To the last day, however, one would still feel that he penetrated into the ice-world in their midst on sufferance merely, and not in man's usual rôle as the master of creation. It is a good thing occasionally to get a genuine sense of one's own littleness.



USHBA.

From a photograph by Vittorio Sella.

The Sella Exhibition.

BY CHARLES E. FAY.

THE vivid revelation of the sublimity and beauty of an alpine world to thousands of our fellow-citizens who before had no realizing sense of its existence,— which was, in brief, the significance of the exhibition of Sella photographs at the Art Club gallery last May,— constitutes a new title to the claim of our Club to be regarded as a society of public utility. An event of so great interest certainly merits commemoration in APPALACHIA.

In magnitude the enterprise recalls the very successful Geographical Exhibition held in the Winslow Skating Rink in 1891. On that occasion our Club was simply the host; the collection itself had been brought together through the zealous efforts of the Geographical Section of the Brooklyn Institute. The Appalachian Mountain Club not unjustly shared in the honors of the occasion for having raised the funds necessary to cover the large expense entailed by the transfer and display of the collection in Boston, and in general for arranging the necessary details of the exhibition.

In the present instance the principal credit reflected upon our Club. As that former exhibition showed as never before in America the contrivances of man for imparting a knowledge of the facts of Nature as manifest upon the earth's surface, so with an equal completeness the Sella Collection, transferring the beholder as by magic into the very heart of Nature, illustrated the Creator's own method of informing the mind of man at the same time that it uplifts his soul.

A brief account of how the exhibition came to be made will not perhaps be devoid of interest. It will be remembered that at the two exhibitions of photographs given under the auspices of the Department of Art at 9 Park Street in 1890, a few of Sella's views, loaned by Mr. F. H. Chapin, formed on each occasion a centre of interest and admira-

tion. Again, at the Geographical Exhibition of 1891, just alluded to, our Society presented a small exhibit of mountain views by Sella, Donkin, and Chapin; and at about that same time Sella was made a Corresponding Member of the Club. The impressiveness of his pictures, and the knowledge that a more extensive display of them had attracted much attention in London, led to the thought that we might secure a similar treat for our fellow-citizens, perhaps at one of the art stores down town, where a considerable number of his views might be on exhibition long enough to make a decided impression on the public, and proclaim the wonderful character of Sella's subjects and the perfection of his technique in photographic art. Thus it will be seen that the outcome far exceeded the modest expectations of the initiators; and this proposed manner of exhibiting will indicate that at the outset the enterprise was not expected to be held under the auspices of the Club.

Correspondence having however shown Mr. Sella ready to do much more than was at first proposed, it seemed as if the enterprise required something more than a personal support; and so the matter was brought to the attention of the Council in the spring of 1892. This body—and, in particular, the Councillor of Art—entered zealously into the scheme, and appointed a Committee of three to act for the Club in arranging for an exhibition to be held the following November. More ambitious ideas of what was possible at once found expression and acceptance. One of the original Committee, our Corresponding Secretary, was a member of the Boston Art Club. Upon his presentation of the case to the governing board of that Society, it generously granted the use of its fine gallery for a period of ten days, rent free, our Club merely to bear the expenses of lighting and attendance. With this most promising outlook, the summer passed for the Committee with pleasant anticipations.

But as autumn advanced a complication arose which for the time being seemed most unfortunate, but which, by the very delay it caused, proved in the end decidedly advantageous. In October it was learned that ill health in Mr. Sella's family and his necessary absence from home had pre-

vented the completion of the pictures intended for the Boston Exhibition, and that it would be impossible to have them ready before April. It was decided to delay the exhibit until May. The Art Club, that had held its offer open to us despite our uncertainties, transferred its hospitality to the newly proposed date, and indeed increased the time of our possible occupancy to nearly three weeks, from May 5 to the 24th.

Meantime Mr. Sella was engaged in making preparations for an event of far greater importance to him than the proposed exhibition in Boston. A Geographical Congress was to be held in Turin in February, 1898, at which a competitive exhibition of landscape photographs was to form a feature. In this department of photography there are many Europeans of high reputation, whose work was to be entered, and to secure the prize every effort must be made. Mr. Sella had doubtless the most extraordinary collection of negatives in the world; but this was not enough. Each photograph of his exhibit must be the perfection of what was possible from each negative selected, and to this end infinite pains were taken in preparing the prints.

In the midst of these preparations a visit to England gave occasion for a most unfortunate accident, so serious as even to imperil Mr. Sella's life. In passing through a tunnel he by an inadvertence struck his head upon some object outside the car, and was so dangerously hurt that rumors reached us that his life was despaired of. So serious was the injury, that he was obliged to remain for some weeks in the hospital at Folkstone, and we can imagine the impatience and misgivings of those days of convalescence. But busy hands at home were continuing the work. When the Congress opened, his exhibit was in readiness, and he was sufficiently recovered to be present and hear the lavish praise bestowed upon his work by visitors and by the press, and to receive as his reward the "grand gold medal and diploma of honor" for his superb collection of Alpine and Caucasian views. It is this so highly honored exhibit of photographs that forms the principal part of what has since become the property of our Club.

Scarcely was the Congress ended when these photographs with certain additions, in all to the number of four hundred and thirty-five, were shipped to Boston by the most rapid method of transportation. They arrived none too soon to relieve the anxiety of the Committee, now increased to six, of whom two of the new members were also members of both the Boston Art Club and our own Society. The opening of the exhibit had been advertised for the 5th of May. It was not until the afternoon of the 8d that the precious case, having passed through the intricacies of the United States Custom House, — the dreary details of which passage were made as endurable as possible by the courtesy of the officials, — was delivered, still "in bond," at the Art Club building. On that same day the work of unpacking and hanging was begun, and carried forward so rapidly by skilful hands — this labor, as of prime importance, had been entrusted to the experienced care of Mr. Eastman Chase — that on the evening of the 5th, according to announcement, some two hundred Club members and friends were admitted for a preliminary view of the whole collection artistically and methodically arranged in geographical grouping. On the next morning it was thrown open to the public, — admitted by ticket, it is true, but tickets were distributed with such freedom that probably no one who desired it need have failed to secure one.

The impression of the first view was one that will long be remembered. It was, as we have said, a revelation; it was a great surprise even to those who, from their knowledge of the situation, had reason for high expectations. No one who was present that evening, or later on, would have found extravagant this language of the art critic of the "Boston Daily Transcript":¹ —

"All the pictorial efforts that have been made to give an idea of the sublimity and beauty of the upper regions of the Alps pale their ineffectual fires beside the photographs of Mr. Vittorio Sella, now on exhibition in the galleries of the Boston Art Club. Painters have vainly tried the impossible task, and it has remained for this indomitable Italian alpestrian to carry his camera

¹ Issue of May 8, 1893.



CREVASSES ON THE GLACIER BLANC, DAUPHINY.

From a photograph by Vittorio Sella.

to the very summits . . . for the purpose of bringing down to us the pictured marvels of those terrible heights. . . . It testifies in a most convincing manner to his skill, his taste, his industry, and his courage. . . . These uncommon pictures afford vivid glimpses of the wonderful and unknown world of snow and ice which exists in the high Alps, a world of terrible desolation and isolation and of awful beauty and majesty. Climbers have hitherto been the only ones to see these things, and it is the distinction of Mr. Sella that he has brought such a rare sensation within the reach of all. There is a peculiar and inexplicable fascination about the grim Siberian wastes of the wind-swept peaks and the lonely upper slopes of the snow-covered Alps which none but the fanatical mountaineer may fully appreciate, and which the spice of danger only augments. . . . Enthusiasm for the mountains will receive a new impulse from the splendid pictures. They are without doubt splendid, for no better photographs could be desired, and snow scenery has never been so beautifully and faithfully represented. The infinitely delicate gradation of values in gray are a study and delight for artists. The structure of the mountains is graphically revealed, and the imposing forms of the cliffs and ridges . . . of so many almost inaccessible heights, affords much rich material for the scientist and explorer."

The arrangement of the pictures, favored by the excellent facilities afforded by the galleries, was all that could be desired. The principal hall contained the Alpine views arranged in groups from left to right, beginning with Dauphiny (I.) and passing eastward to the exquisite Tyrolese views (XI.). Just space enough was left to accommodate the small group of Etna. In the smaller gallery — adjoining the larger by so broad an entrance as to reveal most of its wealth to one standing in the main hall, and *vice versa* — was the superb Caucasian series similarly displayed. With the Swiss groups sheets of the Dufour map were hung, to aid in comprehending the geography of those regions; while on a table in the centre of the main hall was to be found the most pertinent literature of the less familiar mountains.

To no one of our members who looked for the first time on that exquisite display could it have seemed within the bounds of possibility that it could become the possession of our Club.

Hence it was almost with an expression of incredulity that the company assembled on that first evening heard from the Chairman of the Committee that, through Mr. Sella's generosity, such a consummation was not impossible, and that a subscription for the purpose of purchasing the entire collection would then and there be opened. An initial subscription of twenty-five dollars from "A Friend" was immediately announced. While most acceptable, this large donation did not seem consonant with the wish that the subscription should be of a popular character, that the Club should acquire this rich possession through the interest of the many rather than the few. Though the attempt was made to emphasize this opinion by the next following subscriptions, the oppressive sense of the magnitude of the undertaking seemed to prevail, and comparatively few names were upon the list at the close of the evening, — yet these represented the first one hundred dollars of the necessary sum. A circular issued by the Committee served to set the matter in its true light, responses rapidly followed, and it may be said that in general it was found a very easy matter to secure the four hundred dollars which individual members of the Club and others contributed to the fund. The list of contributors with the amount of their subscriptions has been placed on file with the Treasurer of the Club.

On Saturday evening, the 6th, the Art Club held its regular meeting in the gallery, and great interest in the collection was manifested by the gentlemen present, and no small contribution made by some of them to the subscription. Indeed, too much emphasis cannot be laid upon the share of the Art Club in the success of the whole enterprise. In addition to their generosity in placing their beautiful galleries at our disposition for so long a period, their interest in the exhibition led them to distribute thousands of tickets, and thus assure to it something of the same popularity that is enjoyed by their own notable exhibitions.

Every day but Sundays for nearly three weeks, from 10 A. M. until 10 P. M., — with the exception of Saturday evenings, when the rooms were needed for our hosts themselves, — the exhibition was open. As is usual in those covering

considerable time, the attendance at first was not large; but it increased as those who had been there reported to their friends what they had seen, and the last days were crowded, especially at evening. In these the daily attendance reached and passed one thousand. The door-keeper employed by the Committee kept an account of admissions, and the grand total amounted to some nine thousand. A young lady attendant was present in the gallery throughout the entire period, who sold the catalogues of the Collection and so far as possible answered questions.

On May 19 a special meeting of the Club was called at the Art Club Gallery, at which Professor W. H. Niles discussed the value of such photographs in scientific teaching and investigation, and Mr. Wilfred A. French gave an appreciative estimate of the artistic and photographic excellences of the pictures. Some two hundred, members and friends, were present.

And so the pleasant weeks passed, during which the Club seemed to have inherited a new and delightful rendezvous. Before their final removal, the several groups were generously caused to be photographed for a Club album by our fellow-member, Mr. W. O. Witherell. A few large photographs of the entire collection, so far as the arrangement would permit, were also made at the instance of the Committee.

The ease with which the collection can be handled, under favorable circumstances, and with proper division of labor, will appear from the statement that it required only a trifle over an hour for six persons to remove the photographs from the wall, dust them carefully, place tissue-paper between each two to prevent rubbing, and pack them in separate parcels according to groups. When thus packed the whole collection does not occupy over three to four cubic feet of space. This fact is of importance as answering the frequently expressed fear that the Club would have no place to keep its collection!

And thus arises the question, what is to be its future? From the outset the hope has been expressed that it might in other cities of our country impart the same pleasure and contribute to the same knowledge as here in Boston. This

mission accomplished, it should then be arranged in the Club room as a most careful consideration of possibilities shall prove most convenient to one consulting them, with least risk of detriment to the prints, — a problem in regard to which the Standing Committee in charge of the Sella Collection, recently constituted by the Council of the Club, will be glad to receive suggestions from persons interested.

Already measures have been taken with a view to increasing so far as possible the knowledge of these pictures. A few organizations holding a similar position with regard to the public to that of our Club have already been approached, and it is probable that the coming spring will witness as successful exhibitions in other art-loving cities. Arrangements are nearly perfected for an exhibit under the auspices of the Geographical Club of Philadelphia in April at the gallery of the Academy of Fine Arts in that city. The Committee is also in correspondence with the National Geographic Society at Washington, and with the Brooklyn Institute. In the mean time the photographs have been in the custody of Mr. Charles Pollock, to whom the Club is under no slight obligation for favors rendered, and, excepting during the summer months when they would have been subject to injury, one or more groups have, until the holiday season, been displayed upon the wall of one entire end of his establishment on Hamilton Place given up to the purpose.

The details of expenses attendant upon the exhibition will be found in the Treasurer's Report for 1893.¹ It may not be amiss to remark that through the sale of catalogues — of which the Club owns the electro-plates — the Department of Art may receive no inconsiderable income, so that the donors to the fund for the Sella Collection may have the satisfaction of feeling that they have been instrumental in wider benefaction than they had in mind at the time of their giving.

It is but natural that members of the Appalachian Mountain Club should desire to know something of the personality of the man, the results of whose activity as a mountaineer and photographer they have had occasion to enjoy and ad-

¹ See page 257.



Believe me always
yours sincerely
Britton's fellow

mire. We are glad to be able to present a few facts which will serve to satisfy this proper curiosity.

Mr. Sella was born in Biella, northern Italy, in sight of the outliers of the Alps, in 1859. His father, Venanzio Giuseppe, was a woollen manufacturer. The son seems to have inherited some of the paternal versatility; for Venanzio Sella was the author not merely of standard works on woollen manufacture, but also published, as early as 1858, a treatise on the then new art of photography which was translated into German and French and afterwards incorporated in Roret's *Encyclopédie*. It was by his uncle Quintino Sella, the famous Italian minister of finance who also was the founder of the Italian Alpine Club, that Vittorio was first taught to love the mountains. In 1874, as a boy of fifteen, he made his first ascent with him; the second a year later. In 1877 he left school to serve in the cavalry of the Italian army, on the expiration of which term of service he returned to Biella to carry on the manufactory, his father having died in 1876. Every holiday, summer and winter, found him on the mountains of the vicinity, usually carrying an old photographic apparatus which had belonged to his father. To secure his first panorama — that from the highest of the neighboring peaks — he passed two weeks on its summit, at 8,000 feet, in a small and inconvenient tent. In 1880 he began his annual photographic excursions in the Alps, which were continued without interruption until 1889. It was as early as 1882 that his winter crossing of the Matterhorn, ascending by one side and descending by another, made him famous among the climbing fraternity even in London. The speed with which he has accomplished some of his campaigns is something surprising. Thus in 1887, between July 29 and August 11 he climbed the Weisshorn twice, the Mettelhorn, Mittelgabelhorn, Alphubel, Rimpfischhorn, Dent Blanche, and the Dufourspitze of Monte Rosa. In 1888 a similar campaign procured us those exquisite pictures of the Alps of Dauphiny. In 1889 and 1890 he made his two visits to the Caucasus. Each year he still devotes a month or more to his favorite art and recreation, and they lose none of their zest for him.

Our photograph dispels the illusion of such as imagine him

to be a man of powerful build. In height he is only about five feet and six inches, in weight only about one hundred and forty pounds; yet it is reported that he can accomplish a journey of twenty hours, carrying a load of twenty pounds, without excessive fatigue.

Bibliography.

BOLLETTINO DEL CLUB ALPINO ITALIANO, Anno 1892, Vol. XXVI. No. 59, Torino, 1893.

This imperial octavo volume, with its three hundred and fifty pages, its twenty-four illustrations, and eight maps and plans, comes as a fitting yearly memorial of the energy and intelligent activity of one of the largest and oldest of the Alpine societies. The place of honor is held by the portrait and memoir of Felice Giordano, one of the founders of the Club, and a mining and hydraulic engineer of national reputation. He was one of the earliest devotees of Alpinism, and contributed much to the literature of Mont Blanc and the Matterhorn.

Under the title "Ascensioni del Duca degli Abruzzi," F. Gonelli contributes an illustrated paper on his summer tour in company with Prince Amadeo of Savoy, Duke of Abruzzi, a life-member of the Club. They made the ascent of Monte Levanna and its greater neighbor, Gran Paradiso, Mont Blanc and the Dent du Géant, the Breithorn and the Matterhorn.

"La Capanna-Osservatorio 'Regina Margherita' sul Monte Rosa," by Gaudenzio Sella, describes the progress of the work on the club-hut, then projected, now finished, on the Punta Gnifetti, or Signal Kuppe. It stands on the southwest end of the ridge of Monte Rosa, at the height of 14,965 feet, only 177 feet below the highest summit of the great mountain. Its ground plan covers a space eleven and one half feet wide by thirty-one and a half long. It is built with triple walls of American pitch-pine. The first season of active work on the construction, 1891, had been employed in preparing a level foundation for the hut; in the second the materials, ready fitted, were carried to the foot of the last ascent of the Punta Gnifetti. The past summer witnessed the completion of the work. The cabin was occupied by Queen Margherita herself on the night of August 18-19, and Mass was celebrated there in her presence. The formal inauguration of the hut took place on September 4.

Just east of the valley of Gressoney (so beautifully illustrated in Vittorio Sella's admirable monograph), and separated from it by a low ridge, lies the valley of Sesia, falling away from the eastern side of the Punta Gnifetti. While the head-walls of this valley are too formidable for most climbers, their attractions are described by Guido Rey in his article "La Parete Terminale della Valseesia." The frontispiece of the volume, from one of Sella's photographs, belongs to this paper.

In "Il più grande Ghiacciaio del Mondo" (the largest glacier in the world) Luigi de Marchi reviews Dr. Nansen's account of his expedition across Greenland.

The Val Camonica, one of the prettiest in the Southern Alps, though little frequented by travellers, lies a little northeast of Lake Iseo in Northern Italy. Its charms and those of the neighboring valleys are set forth by Paulo Prudenzi. The paper is accompanied by a very clear map of the region on a scale of 1:40,000.

Carlo de Stefani contributes a topographical study, with map, of the mountain systems of Italy and the adjacent islands, under the title "Divisione delle Montagne Italiane."

"I Laghetti d' Esine," by Arturo Cozzaglio, treats of the origin of a series of curious pits, formed in very recent times by the falling in of the surface of the ground, near the little village of Esine in the lower end of the Val Camonica.

Much as the Dent du Midi, the one near the Lake of Geneva, with its imposing form and varied summits, has been studied by the Swiss Alpine Club, its attractions had not been so far exhausted but that E. de Breugel Douglas has found there materials for "Three new Excursions in the Chain of the Dent du Midi." After noting the first ascents of the seven principal summits, which vary in height from 10,130 to 10,600 feet, he gives an account of his passage, the first made, along the ridge connecting the two peaks, the Cathedral and the Fortress. Afterwards he describes his ascent of two of the middle peaks and of the eastern summit, made by him for the first time by their steep northeast faces.

"Among the Dolomites of Cortina d' Ampezzo and of Gardena" is the taking title of a paper by Orazio de Falkner. After deploring the almost entire neglect of this glorious region by Italian mountaineers, he proceeds to describe his most agreeable ascent of the well-known peaks, Antelao, Piz Popena, Becco di Mezzodi (they have a Noonmark there, too), Sorapis, and Le Cinque Torri. The attack on Sorapis was on the northern side, and was a "first ascent."

The eruption of Etna in 1892, with brief notes on preceding eruptions, is the subject of a well-illustrated article by Professor Antonio Aloï. The lava stream at this time issued from several craters some distance below the summit of the mountain. In comparing this eruption with the nine others which have taken place in this century, the author ranks it second in the duration of its activity and in the area covered by the lava, but first in the amount of matter ejected, though his statements and figures do not quite agree on this point.

Cesare Fiorio describes an ascent of Becco della Tribolazione in the group of Gran Paradiso, a piece of rock-climbing requiring strong nerves and a steady head. Comparing it with the ascent of the Dent du Géant, which he made a few days later, he says that the former requires more mountaineering experience and the latter more acrobatic skill.

"The Maritime Alps, like every great group of mountains, are a type in miniature of the Alpine world." To illustrate this and to point out the beauties of that little-visited region, Signor L. Purtscheller presents a complete monograph of that corner of Italy.

"I Bradisismi in Montagna e la Fotografia," is the title of an interesting study by Francesco Salmoiraghi. "Bradisismi" are simply slow oscillations in the surface of the earth. By such gradual elevations or depressions of the surface the relative position of lofty summits is slowly changed, and by carefully arranged series of photographs extended over a long term of years the comparative amount of these movements could be studied.

F. W. F.

ANNUAIRE DE LA SOCIÉTÉ DES TOURISTES DU DAUPHINÉ. Dix-huitième année, 1892. Grenoble, 1893.

Perhaps the pages of this familiar periodical of which the Society is most proud are the first two, containing the decree of the President of the French Republic recognizing the Society as an "établissement d'utilité publique."

Following the Constitution of the Society and its list of members, who now number 631, is a sketch of the meetings and transactions of the Club and its Parisian section for 1892.

In accordance with a provision of the Constitution requiring such publication, there follows a résumé of all the excursions and ascents made in Dauphiny during the year, with dates and names of participants, and some details of the more important climbs, though none are noticed unless they reach a greater height than 7,000 feet.

A full account of the biennial field-meeting of Bourg d'Oisans, with the detailed record of the grand tramps and climbs following, makes one envy the good fortune of a club having such opportunities for mountaineering at its very doors.

What Tyndall and Whymper did for the regions about Chamonix and Zermatt that has W. A. B. Coolidge done for the Alps of Dauphiny. He is their priest, prophet, and panegyrist. In this volume he contributes a delightful article, "L'Oisans il y a vingt Ans," reviving the memories of his first excursions through that part of Dauphiny in 1870, 1871, and 1872.

Seen from the spire of Milan Cathedral on a clear day, or better yet from the Superga near Turin, Monte Viso presents a most striking appearance with its sharp, slender pyramid rising in solitary beauty so far from any rival. In 1860 M. Reclus declared that its summit, rising to the height of 12,500 feet, could not be scaled until the solution of the problem of aerial navigation. The ascent from the south, however, offers no great difficulty, but none but experienced mountaineers can reach the top by the northern face. M. D. Revel, in "Une Ascension au Mont Viso," describes the successful accomplishment of this feat.

Under the title "Le Col du Pavé," M. V. Martinais gives a graphic account of an excursion, made in connection with the field-meeting at Bourg d'Oisans, over this pass alongside of the highest of the Alps of Dauphiny. His route is nearly the same as that of M. Granjon de Lépiney, described in the last Annual of the French Alpine Club, though travelled in the opposite direction. His spelling of la Meidje (with a d) is an innovation; does it better represent the local pronunciation of the name?

"Ascension de la Loule-Blanche," in the Tarentaise, by M. H. Ferrand, completes that part of the volume.

Under the rubric "Articles Scientifiques et Techniques," M. W. Kilian, Professor of Geology at Grenoble, contributes an article on "Neiges et Glaciers." This is the third paper in this series, and treats specially of moraines. Following this part of his paper is a résumé of "Observations sur les Glaciers du Dauphiné, 1893." The condition and progress of each glacier is noted. To this account, the first made under the auspices of the Club, is added the observation made by Prince Roland Bonaparte on the same subject, already published in the Annual of the French Alpine Club for 1891. Out of thirty-four glaciers noted, twenty-seven had already been observed; and of these thirteen were retreating, seven were advancing, and seven were stationary.

M. Albert Perrin has a paper on "L'Influence du Climat Alpin sur les Végétaux."

In "La Dépopulation de la Montagne," M. E. Guinier notes the decrease of the population of the department of Basses-Alpes from 159,044 in 1836 to 124,258 in 1891; of Hautes-Alpes from 133,100 in 1846 to 115,522 in 1891; and of Savoie from 275,000 in 1861 to 263,297 in 1891. He attributes this decline to a growing desire of the inhabitants to exchange their rude climate for one less rigorous.

M. Paul Guillemin edits and presents a very readable article of historical interest entitled "Le Briançonnais en 1754, par Jean Brunot, Seigneur d'Argentière."

A very complete "Revue des Publications Périodiques Alpines" closes the volume.

Aside from three small sketch-maps, to illustrate the movement of glaciers, the whole book is painfully bare of illustrations and maps.

In reviewing APPALACHIA, Vol. VI., the editor (M. Henri Ferrand?) says, "The Appalachian Mountain Club . . . does not seem to show, in its publications at least, any very great activity." Later he says, "This volume, sumptuous as it is, and containing sixteen maps and illustrations, does not contain a single article on the Alps." Well, it is a misfortune, which we never cease to deplore, that the Alps are so far from Boston. But the Alpinists living nearer them are so tireless in their study, and so graceful and comprehensive in their descriptions of them, that we of the Appalachian Club usually content ourselves with what our cognate societies say about them, and devote our energies to the development and description of mountaineering nearer home. The present volume, however, will not be open to this criticism.

F. W. F.

ZAPISKI KRUIMSKAGO GORNAGO KLUBA. (Bulletin of the Crimean Mountain Club, No. 3.) Odessa, 1893.

It is but a short time ago (1891) that announcement was made in a session of our Club of the formation of a mountain club in Russia,—the first in that country, not unnaturally late to join with other nations in this interest, since the mountains of the Empire are so remote from the great centres of population and culture. But it is not so very far,—only a sail by steamer of some fourteen hours from Odessa,—to a region sometimes mentioned with Naples and the Bosphorus as among those most endowed by Nature with her favoring gift of beauty, a region which to us, so far away, suggests more naturally the scenes of war and carnage, the Crimea. The mountains which deeply hem the southern shore of this peninsula are said to be of rare beauty, though not of Alpine height; Chatuirdag, the highest, measures but about 5,200 feet. These mountains, the ravines and bays that indent the coast, the salubrity of the climate, have at last found an ardent appreciation, and a society, similar in its purposes to the Norwegian Tourist Club, has been formed to make them better known and more enjoyed. This society has its centre at Odessa, but sections have been formed on the peninsula itself at Sebastopol and Yalta.

The Club, immediately upon organizing, entered upon the work of publication with much spirit. Besides its annual bulletin, it issued in its first year several monographs by leading members. N. Melnikof published one setting forth the reason for the Club's being; U. Listof one on "Alpinism and the Crimean Mountain Club," largely a sketch of the rise of Alpinism, and another of scientific purport on "Hypsometric Measurements in the Tauric Mountains;" V. Dmitrief was the author of a pamphlet on "An Excursion to Bachtchisarai and the Transmontane Crimea,"—a study in hygiene, together with a report of the activity of the Yalta section during the first two months of its existence. Finally, in this first year appeared a little handbook of vital interest to visitors to the Crimea,—where even the Russian is at a loss for a means of intercommunication with the rustic population,—a concise Russo-Tartar dictionary for tourists, with some eight hundred of the most usual words and phrases of the Krim dialect of the Tartar language, the very cream of the speech.

The Crimea as a sanitarium seems to occupy much thought, for in 1892 there appeared a publication by A. B. Delagarde and Professor R. Prendel on "The Choice of a Place for a Sanitarium and Boarding-school in the Crimea;" in the same year was published a translation from the French on "Alpinism and Hygiene," by Dr. Mardonel, and a book by N. Poggenpol, entitled "On Alpine Snows and Paths." This is surely an excellent showing for so young a society.

The Bulletin is an octavo of almost eighty pages, being composed chiefly of special articles. Unlike most such periodicals, the official section precedes these; in the number before us it embraces a brief preliminary report of the doings of the Club for the year 1892; a supplementary list of members, from which it appears that the mother society numbered 335 active members in December, 1893, while the Yalta section seems to outnumber it with 341. The supplementary list of corresponding societies with twenty-nine items indicates a widespread interest abroad regarding this Club. The remainder of the official section is devoted to the programmes of a Crimean exhibition to be held in Odessa under the auspices of the Club.

The scheme of taking school boys and girls upon outings carried to so great extent, for one sex at least, in France under the auspices of the Alpine Club, has been undertaken in the Crimea under the charge of the local section; a beginning has at least been made there. A report of two such outings, one for each sex, opens the unofficial section. The day chosen for each is a summer Sunday: the boys are taken to a vineyard to study viticulture; the girls visit a fortress, examine archeological remains, are given a lecture in local botany, enjoy a view of a cascade,—in short, seem to have the best time, as perhaps was due to their larger numbers, fifty-three against fifteen on the boys' day.

The special articles are devoted to descriptions of prominent excursions made in the mountain region of the peninsula, from a casual review of which we infer that the scenery is rather beautiful than grand, the hand of man having lent the charm of culture to an already attractive landscape. The beauty of the orchard and cultivated field impresses the writers strongly, if not perhaps equally with the natural picturesqueness of the scenery. The leading papers are those of W. Dmitrief on an excursion to Chatuirdag, followed by a description of the caves on the mountain side, and two similar articles by N. Nikolski on a visit to Mt. Mangoup-Kalé, and to its caves. The last-named paper is accompanied by a sketch showing the ground plan of several of these grottoes.

The paper relating the ascent of Chatuirdag seems most inspired with the spirit of the mountaineer, at least of the lover of out-of-doors. C. E. F.

DEN NORSKE TURISTFORENINGES ÅRBØG for 1893 (with twenty-one illustrations). Christiania, 1893.

The always handsome annual of the Norwegian Tourist Club presents in its latest issue a particularly fine appearance, to celebrate the twenty-fifth anniversary of the founding of the society. The work of this organization is primarily to make known the beauty of Norway and its desirability as a resort for tourists, as well as to facilitate travel in this land so richly endowed by Nature. The Club's efforts in this direction have been attended by marked success, as is testified among other evidences by the large number of foreigners, especially of Englishmen, enrolled in its membership. Of the total enrolment of 2,531, about one third (813) are foreigners, of whom 380 are English, and 149 Americans; among these latter we find the names of more than one of our own members.

This varied membership accounts for the somewhat novel phenomenon of a bilingual magazine; of the hundred pages of the present number that are devoted to special articles and communications, about one fourth are by English authors, and are printed in English.

The contents of this number are generally of an anniversary type. The volume opens with a series of plates presenting portraits of the past officers of the Club, followed by a series of brief biographical notes upon each, especially in his relations to the society. Some twenty pages near the end of the volume describe the banquet which celebrated the close of the first quarter century, with some of the speeches and poems.

The place of honor among the special articles is given to the description by Mr. Carl Hall of the first ascent of the Tiltorn in northern Norway— which two excellent illustrations represent as a remarkable crag, whose conquest would seem to be a good preparation for one who should propose to try Lizard's Head in Colorado, as yet unscaled.

Of the English articles the longest, written as an anniversary paper, is contributed by Mr. Wm. Cecil Slingsby, well known as a mountaineer in the Alps as well as Norway, under the title "Down to the Valley Again," with the connotation of an involuntary descent. Mr. Slingsby's papers have usually been the record of successes. This time he "determined to break new ground and give a description of happy days of failure. Some half-dozen descriptions of unsuccessful attempts make up the subject matter, failures for which bad weather is chiefly responsible. We heartily agree with the author that "no day spent on a mountain side can be described as a lost day, let the weather be what it may."

Three other Englishmen, Messrs. Hoddinott, Goodfellow, and Woolley, contribute a joint article on "A Visit to The Horungstinder in 1892." The accompanying illustrations give additional evidence that Norwegian peaks may offer, even to Alpine climbers, work worthy of their attention.

The leading scientific paper is by Mr. P. A. Øyen on the glaciers in Jotunheim,

which as a very recent investigation of different types of ice-streams in Norway must present much of interest to glacialists. The remaining articles are principally touristic, and are well illustrated. As is to be expected in a work on Norway, beautiful cataracts find mention and illustration, as here the rushing Pollfoss and the falling veil of the Vittisfoss. The lonely dreariness of the "fjeld" is vividly represented in the reproductions of Mr. Rooke's photographs taken on the Geirangervei, "Norway's grandest fjeld route." Our "Middlesex Fells" may have borrowed a name from this source, but even their midwinter aspect is more hospitable.

The Norwegian Tourist Club and its magazine are a credit to Norway, and all lovers of Nature will join in the hope that its semi-centennial will witness the same steady growth in numbers and in usefulness that its vigorous life has thus far manifested.

C. E. F.

L'ÉCHO DES ALPES. Publication des Sections Romandes du Club Alpin Suisse.
30^{me} Année, 1893. No. 4, 8°. Geneva.

In our last issue the annual of the Swiss Alpine Club was made the subject of a review. That luxurious publication is in the German language, that of the majority of the members of this polyglot society. The sections which speak neo-Latin tongues have their own periodical, published in French and issued upon a different plan. L'Écho des Alpes appears quarterly, in parts of sixty-four, or more, octavo pages, and is a very modest publication.

The current number opens with a racy description of the inauguration of a refuge built by the Neuchâtel section above the glacier of Saleinaz, at the northeastern extremity of the chain of Mont Blanc. "The site of the hut dominates this glacier; it is a pleasant little plateau, partly covered with a thin, short grass. Avalanches of snow or stones have no terrors here; the snow does not accumulate, the spot is lighted by the sun all day long. The lack of water is the only drawback." For view, "in the immediate foreground the immense upper portion of the glacier, which one overlooks in its full extent; beyond, the incomparable prospect of those majestic peaks: the spires and needles of Planereuse, the Darrel, the Grande Louis, the Arguilles of Neuva, Argentières, Chardmont, the great and lesser Fourche, the Arguilles Dorées, and, closing this unequalled amphitheatre, the proud and graceful Portalet."

The hut is made with double walls of plank with an air space, and measures inside about 15 by 20 feet, — or nearly a third larger than our Madison Spring Hut. Its capacity is twenty-four persons, of whom eight, supposed to be guides, are separated from the others with poorer accommodations. Twenty-five actually occupied it in the trip taken to "inaugurate" it! This event is brightly narrated by Mr. A. Rychuer, the author of the article.

Mr. Jules Fiaux discusses "Alpinism from an Educational Point of View," advocating mountain climbing even for children of five to twelve years. This may seem to some to be tending to the *reductio ad absurdum*; but if only the mountains chosen are proportionate to the age, we think Mr. Fiaux's thesis will stand. It would be an interesting study to find out at what age a true appreciation of natural beauty develops. The present writer knows of children who ought to have inherited some aptness in this direction. They began their education at the ages of five, six, and seven respectively, and now are all extremely fond of the mountain and forest; but a rough estimate would fix ten or eleven years as the time of real enjoyment of Nature in their case. As to a child's advantage over a grown person for not too lengthy trips, a point our author urges, there would seem to be no doubt of it. As little doubt is there of the excellence of the teaching possible in this school of out of doors.

The third and last special article on the "Vanil des Artzes" ("Staircase Rock"), so called for reasons similar to those which gave the name to the Giant's Stairs in the White Mountains, a peak some 6,700 feet in height, a short day's excursion from the

upper end of the Lake of Geneva, from Vevay or Montreux. The author especially recommends it for an October day, and praises its prospect highly.

The latter half of the number is occupied by the rubrics Miscellany, Chronicles, Bibliography, and Notes, of which the first records brief communications of importance secondary to special articles; the second, reports from the different Romance sections; the others are self-explained. Appended is a catalogue of all the ascents of peaks above 6,500 feet in altitude, or over passes above 8,000 feet, made by members of the Romance sections. It makes a long list, and speaks for much activity. C. E. F.

SIERRA CLUB BULLETIN, Vol. I. No. 3, January, 1894. [Publications of the Sierra Club, No. 6.]

The formation of a vigorous society of mountain lovers at San Francisco has already been mentioned at a meeting of our Club. It was *à propos* of the paper on "An Ascent of Mt. Ritter" by Mr. J. N. LeConte, which afterward appeared as the opening article in the present volume of APPALACHIA. At about the same time there came to hand a modest little pamphlet, welcome indeed as indicative of the fact that the Sierra Club had come to stay, but somewhat of a threat withal that APPALACHIA's newly opened sources of supply from the Sierra Nevada were likely to fail through diversions for home consumption.

The second issue of this magazine retained the same modest proportions, — a duodecimo of perhaps thirty pages; the new year, 1894, however, witnesses a sudden development in its importance, and the Sierra Club Bulletin No. 3 comes to us as a quarto of forty-eight pages, with no less than nine illustrations.

The number is made up of four articles. The first, entitled "Among the Sources of the San Joaquin," by Mr. Theodore S. Solomons, is the exceedingly interesting description of the sequel to the excursion to Mt. Ritter described to us by Mr. LeConte. Mr. Solomons was one of that same party. After returning to the Yosemite Valley with his companions, he planned to explore, with another of their number, the region south of Mt. Ritter, — to undertake, that is, a month's trip in a wholly uninhabited region. His companion being prevented from going, Mr. Solomons, with a wonderful spirit of independence (that is, it would seem wonderful in any other land), resolved to go alone, with a single rather intelligent mule to bear him company, and especially to transport his supplies and camera. We are all under great obligations to "Whitney" (so named for the great peak) for having made possible the expedition, and especially the securing of some excellent photographs which half-tones finely reproduce for us. Mr. Solomons made a second ascent of Mt. Ritter, and thence found his way, with more than one adventure and no small risk, all of which is brightly narrated, by the cañons of the upper waters of the San Joaquin out to the great valley of this stream.

Mr. C. Mulholland writes a brief description of the first ascent, so far as is known, of a fine summit in the immediate vicinity of Mt. Whitney, and inferior to it in altitude by only a few hundred feet, which their party christened "Mt. Barnard," in honor of the astronomer. It is recorded as 14,300 feet in height, and evidently affords some fine crag-climbing.

The third article, also brief, is a pleasant description, by Mr. A. W. de la Cour Carroll, of a trip, complementary to the preceding, to the summit of Mt. Williamson. This peak forms, with those of Whitney and Barnard, an equilateral triangle whose side is only about a mile in length. Grandeur is packed closely in the High Sierras! Mr. Carroll's camera is also obviously an experienced one. His view of Mt. Whitney from Mt. Williamson, which is honored with the position of frontispiece for the number, is peculiarly beautiful. No view we have seen of Mt. Whitney does it so much justice. Mr. J. N. LeConte closes the number with a valuable itinerary article entitled "Notes on the King's River and Mt. Whitney Trails (July and August, 1890)." Mr. LeConte was one of the party whose interesting experiences were described to us in APPALACHIA,

Vol. VI., by Mr. Herbert Dyer, and the present notes were taken on that trip. They are particularly intended to aid visitors to that region, and are illustrated with diagrams and two pretty half-tones of Kearsarge Pass and of Mt. Whitney seen from the west.

A list of additions to the Club between October, 1892, and the time of going to press gives about fifty regular, six honorary, and two corresponding members. C. E. F.

AROUND THE WORLD, Vol. I. No. 3 (pp. 43-82). February, 1894. Edited by Professor ANGELO HEILPRIN. The Contemporary Publishing Co., New York and Philadelphia. Large 8°. Issued monthly.

All lovers of geographical studies, of travel, and of beautiful reproductions of natural scenery, have surely reason to take pleasure in this new-comer into the field of periodical literature. Its aim, as set forth in its statement of purpose, is "to present its readers with the latest results of exploration in the geographical field, with descriptions of countries lying in and off the general avenues of travel, with an analysis of the progress of research in all departments touching the physical history of the earth and its productions. . . . Every effort will be made to have its matter represent the latest thought on any subject, and to make it representative of a knowledge of the world at large. In its department of illustrations special stress will be laid upon faithful and vivid interpretation, and upon perfection of mechanical execution."

The fact that the editor is the President of the Philadelphia Geographical Club is a warrant of ability to carry out the broad scheme thus laid down; the fact that he is also an experienced mountaineer is an assurance to mountain lovers that their tastes will be met. The three numbers that have already appeared embody a satisfactory fulfillment of the editorial promises. The February issue gives, among other articles, glimpses of Mexico, Hawaii, and Sicily, and discusses a proposed Antarctic expedition. Our Club members will find especially interesting Professor Heilprin's story of his ascent of Orizaba, and an article on "Landscape Painting and the Laws and Forms of Nature," — a topic which excited much discussion among us in the early days of our Club's history. In the article on Orizaba it seems to us that the editor has failed to see some of the latest contributions to the study of mountain sickness, alluded to in our last issue in a review of the *Jahrbuch* of the Swiss Alpine Club.

We must congratulate "Around the World" on its success in the department of illustrations. The rare beauty of its half-tone work impressed us in the first number, and the standard there set up has been well sustained. *APPALACHIA* will perhaps be the gainer by the spirit of emulation they excite. We reserve a little of our admiration, however, in respect to the colored plates. These do not seem to us a success. A single tint in gelatine reproductions is tolerable even when untrue to Nature; but when applied to a half-tone, it becomes a wash. In "The Sunlit Forest of Orizaba," the color suggests a sifting of all the rays through a pale green skylight. C. E. F.

Report of the Recording Secretary for 1893.

ON Jan. 1, 1894, the corporate membership of the Club was 839. The losses amounting to 79, the accessions to 99, and two memberships having been revived, the net gain for the year was 22. The Honorary Members numbered 11, John Tyndall having deceased; the Corresponding Members, 46, Lieut. R. E. Peary having been added, and Miss Lucy Larcom and N. G. Dietrichson having deceased. The Life Members numbered 72, Mrs. F. J. Chapin having deceased, and ten new Life Members having been added to the list. The total membership was 896,—an increase of 20.

There were held during the year nine regular and six special meetings and one field meeting, the average attendance being 116. At these meetings there were presented five reports and eighteen papers. In the presentation of papers it is remarkable that the White Mountains were neglected, except in the general treatment of the forestry question. Alaska, British Columbia, and Switzerland were represented by two papers each, and New York, Arizona, California, Washington, Peru, Hawaii, India, Syria, France, and Australasia by one paper each. Nine of the meetings were held in the evening, and seven of the papers were illustrated with the stereopticon. It has been a year of unusual interest so far as the meetings of the Club have been concerned, and the chief credit for this has been due to the President.

A successful field meeting was held at the Waumbek House, Jefferson, N. H., July 1-8, at which the subject of forest preservation was discussed. Later in the same month several camping-parties visited the camps of Mr. J. R. Edmands in the Ravine of the Cascades on Mt. Adams. For further account of excursions and outings reference is made to the report of the Excursion Committee.

The Snow-Shoe Section held its annual meeting in January. There were several meets in the vicinity of Boston, and fine

shoeing was enjoyed during the winter excursion to Woodstock, Vt., the ascent of Ascutney being included.

The annual social meeting was held at the Hotel Vendome, February 10, with an attendance of 157.

Two numbers of APPALACHIA were published, — Vol. VII. No. 1, in February, and No. 2 in December.

A successful exhibition of Sella's photographs of mountain scenery was held in May at the Gallery of the Boston Art Club. The attendance was very large, and the photographs were highly praised from an artistic and educational as well as mountaineering standpoint. The collection is now the property of the Club, and arrangements are being made for its exhibition in other cities, thus bringing revenue to our treasury and credit to our reputation.

During the early part of the year an observatory or lookout was erected on the summit of Bear Hill, Middlesex Fells. It was voted for in 1892, but built and paid for in 1893, and the expenditure therefore belongs to the preceding year. The upper platform commands a fine view of Wachusett and Monadnock and especially of the Fells, which the Metropolitan Park Commission of Massachusetts is now proceeding to take as a public reservation. Earnest work was done by the Club and its members in securing the enactment of the Metropolitan Park Act, — legislation which will prove of immense value to this community, and will be especially appreciated by the lovers of the woods and hills.

It should be mentioned that the Club has made during the past year a modest recommendation with reference to the names of the Ossipee Range; and attention should be called to the unusual activity of the Department of Improvements. Much work has been done in reopening old paths, and also in fixing the responsibility of the Club for paths and camps.

In the discussion of the New Hampshire forestry question the Club has taken active and earnest part, and something has been accomplished in the legislation secured. The problem, however, is difficult, and the task great. The Appalachian Mountain Club proposes not only to discuss but to act, and is accordingly preparing to take the most important step since its organization in 1876, — to qualify itself to receive, hold, and

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administer real estate. It is hoped that a good beginning will soon be made by acquiring the summit of Passaconaway, one of the finest forest-clothed mountains of New Hampshire.

Respectfully submitted,

ROSEWELL B. LAWRENCE,

Recording Secretary.

Report of the Corresponding Secretary for 1893.

So little variation from the ordinary routine has marked the conduct of this office during the past year, that a report would closely resemble the famous chapter on "Owls" in the Natural History of Iceland. But, in retiring from the position which I have held by your grace for the past six years, I may be permitted to note the progress and changes in the Club relations and resources which fall within that period. Not that I claim any of these advantages or gains as the result of any special activity or energy on my part; they are due to the merit and reputation of the Club itself.

In the relations of friendly interchange of greetings and of publications, our own progress is somewhat gratifying. These relations have been formed with the following nineteen organizations: Club Alpino Italiano, Sezione di Roma; National Geographic Society of Washington; Svenska Turistforening, of Stockholm; New Hampshire State Library; Geological Survey of Missouri; Société des Touristes du Dauphiné; Oregon Alpine Club; Kruimskii Gornuii Klub, of Odessa; Club Alpino Italiano, Sezione di Belluno; Société de Géographie de Paris; Club Alpin Français, Section de Haute Bourgogne; Club Alpino Italiano, Sezione di Milano; New Zealand Alpine Club; Sierra Club; United States Coast and Geodetic Survey; United States Department of Agriculture; Geographical Society of the Pacific; Rassegna delle Scienze Geologiche, of Rome; Società Alpina Meridionale, of Naples. The last three were added during the past year. It is worthy of note that while six years ago ours was the only distinctively mountaineering club in this country, two others have

since been organized, the Oregon Alpine Club, and the Sierra Club of California.

The Bonn Section of the Deutscher und Österreichischer Alpenverein, and the Rocky Mountain Club have been dropped from our list, the latter because it had ceased to exist as a mountain club. The Scottish Geographical Society closed its relations with us, apparently from considerations of economy. We are now in correspondence with all but two of the most active Alpine and geographical societies of the world. The new resources of the Club in Honorary and Corresponding members suggest a means of completing the list by the addition of these two.

The growth of our library is very notable. Owing to the different methods of counting books and pamphlets then and now, it is impossible to compare in numbers the size of the library of six years ago with that of the present day. Twice within this term a new book-case has been added, and even now many books are packed away out of sight for lack of shelf space to display them. The books occupy three times the room that they did then. Reckoning by the method mentioned in my report of last year, our library has been increased in 1893 by 104 volumes and 21 pamphlets, making the total number now belonging to the Club 1,080 volumes and 531 pamphlets. The maps have been rearranged and newly catalogued, and now number 1,187, of which 90 were received during the past year, mostly from the United States Geological Survey. One set, however, Dufour's famous map of Switzerland in twenty-five folio sheets, deserves special mention. It is the gift of a member of the Club, for which due credit is given in the appended list of donations. And here it may be remarked that not infrequently it is impossible to acknowledge gifts of books, since they come to us without any clew to the name of the sender.

Notwithstanding the size of our library, probably the largest in its specialty in this country, it leaves much to be desired from the incomplete condition of some of its most valuable publications. For instance, we lack the first volume (1874) of the Annual of the French Alpine Club, the first eleven volumes of the Alpine Club of London, the first two volumes

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of the Proceedings of the Royal Geographical Society of London, the first five volumes of the Annual of the Deutscher und Österreichischer Alpenverein, the first two Annuals of the Swiss Alpine Club, and the first sixteen volumes of L'Echo des Alpes, published by the same club. Through the kind co-operation of our Corresponding Member, Mr. R. H. Budden, we have been able to procure several of the earlier numbers of the Annual Bollettino of the Italian Alpine Club. But most of the magazines desired are out of print, and it is only rarely that stray copies come into the market. Those which are for sale are promptly caught up by European collectors before we can know of their existence. It is to be hoped that special attention may be given to this matter, so that our library, already so valuable, may not long lack completeness in the works mentioned.

Annexed to this report is the usual Appendix containing a detailed statement of accessions to the library in 1893, with the sources from which they come.

Respectfully submitted,

FRANK W. FREEBORN,
Corresponding Secretary.

ACCESSIONS TO THE LIBRARY FOR THE YEAR 1893.

FROM CORRESPONDING SOCIETIES.

American.

American Geographical Society. — Bulletin XXIV. 4, Part 1, 2; XXV. 1-3.

American Museum of Natural History. — Annual Report, 1892; Bulletin, 1892, No. 4.

California Academy of Sciences. — Occasional Papers, III. IV.; Proceedings, 2d ser. Vol. III. Part 2.

Cambridge Entomological Society. — Psyche, Vol. VI. 201-212.

Essex Institute. — Bulletin, Vol. XXIV. 7-12; XXV. 1-3.

Geographical Society of the Pacific. — Transactions and Proceedings, Vol. II. 1; III.; The Magnetic Pole; New Caledonia; Arctic Ice Notes; Arctic Drift and Ocean Currents; Shoaling of the Bar at Entrance to San Francisco Harbor.

Geological and Natural History Survey of Canada. — Annual Report, V. Parts 1 and 2 and maps (1890-1); Catalogue of Section I. of the Museum; Catalogue of stratigraphical collection of rocks prepared for the World's Columbian Exposition at Chicago.

- Geological and Natural History Survey of Minnesota.* — Annual Report, XX. (1891); Bulletin, 8.
- Lick Observatory.* — Terrestrial Atmospheric Absorption of the Photographic Rays of Light.
- National Geographic Society.* — Vol. IV. pp. 163-215; V. pp. 1-96.
- Philadelphia Academy of Natural Sciences.* — Proceedings, 1892, III.; 1893, I. II.
- Sierra Club.* — Publications, 1-3; 2 maps.
- Smithsonian Institution.* — Annual Report, 1873, 1875.
- Torrey Botanical Club.* — Bulletin, XIX. 11; XX. 1-11.
- United States Department of Agriculture.* — Bulletin New England Weather Service, 1893, 14-21; Monthly Weather Review, Jan.-Sept., 1893; Certain Climatic Features of the Two Dakotas, by John P. Finley.
- United States Geological Survey.* — Annual Report, XI. Parts 1 and 2; Bulletin, 82-86, 90-96; Mineral Resources of the United States, 1891; Monographs, XVII. XVIII. XX.; Atlas to XX.; 62 Atlas sheets.

Foreign.

- Club Alpin Belge.* — Bulletin, 1891, No. 15, 16; 1893, No. 17.
- Club Alpin Français.* — (*Direction Centrale*) Annuaire XIX.; Bulletin, 1892, 9; 1893, 1-8. (*Section des Alpes Maritimes*) Bulletin XIII.; (*Section du Sud-Ouest*) Bulletin XXXII. XXXIII.
- Club Alpino Italiano.* — (*Direzione Centrale*) Bollettino, XXVI. 59; Rivista Mensile, XI. 12; XII. 1-11; (*Sezione di Belluno*) XXV. Congresso Nazionale Alpino, 1893, in Belluno; Il Viaggiatore nel Bellunese; (*Sezione di Milano*) Relazioni-Bilanci Elenco dei Soci.
- Club Alpin Suisse.* — (*Comité Central*). Alpina, Ann. I. 1-6. (*Section Genevoise*) L'Écho des Alpes, 1892, 4; 1893, 1-3.
- Deutscher und Österreichischer Alpenverein.* — Mittheilungen, 1892, 24; 1893, 1-22.
- Kruimskit Gornuŭ Klub.* — Bulletin No. 3.
- New Zealand Alpine Club.* — New Zealand Alpine Journal, Vol. I. 2, 3.
- Norske Turistforening.* — Årbog, 1893.
- Österreichischer Alpenclub.* — Österreichische Alpen-Zeitung, XIV. 364; XV. 365-369.
- Österreichischer Touristen-Club.* — Österreichische Touristen-Zeitung, Bd. XII. 3, 11-13; XIII. 1-5, 20-23.
- Siebenbürgischer Karpathenverein.* — Jahrbuch, XIII.
- Società Alpina Friulana.* — In Alto, III. 4; IV. 1-6.
- Società Alpina Meridionale.* — Bollettino, I. 1, 2, 4.
- Società degli Alpinisti Tridentini.* — Annuario, XVI. XVII.
- Società Alpina delle Giulie.* — Atti e Memorie, Maggio, 1887 — Dec., 1892.
- Société des Touristes du Dauphiné.* — Annuaire No. 18, (1892); Les Guides et Porteurs de la Société.
- Svenska Turistförening.* — Årsskrift, 1893.

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Kais.-königliche Geographische Gesellschaft. — *Mittheilungen*, N. F. XXV. *Kais.-königliches Naturhistorisches Hofmuseum* (Vienna). — *Annalen*, VII. 3, 4; VIII. 1, 2.

Nederlandsch Aardrijkskundig Genootschap. — *Tijdschrift*, Deel IX. 8; X. 1-7.

Royal Geographical Society. — *The Geographical Journal*, Vol. I. 1-6; II. 1-6.

Sociedad Geografica (Madrid). — *Boletin*, XXXIII. 4-6; XXXIV. 1-6; XXXV. 1-3.

Sociedade de Geographia (Lisbon). — *Boletim*, 11^a Ser. 3-12; 12^a Ser. 1, 2; *Indices e Catalogos* I.; *Catalogo dos periodicos politicos*, etc.

Società Geografica Italiana. — *Bollettino*, V. 12; VI. 1-9.

Société de Géographie (Paris). — *Bulletin* XIII. 3, 4; XIV. 1, 2; *Comptes Rendus*, 1892, 1-6, 17, 18; 1893, 1-16.

Société de Géographie Commerciale (Bordeaux). — *Bulletin*, 1892, N^o 22-24; 1893, 1-21.

Société de Géographie Commerciale (Paris). — *Bulletin*, Tome XIV. 5; XV. 1-3.

Société de Géographie (Tours). — *Revue*, 1892, 9; 1893, 1-4.

Société Royale de Géographie d'Anvers. — *Bulletin*, XVII. 1-4.

Société Khédiviale de Géographie. — *Bulletin*, Series III. Nos. 10-12.

Teikoku Daigaku (Imperial University, Tokyo). — *Calendar*, 1892-3; *Journal of the College of Science*, V. 3, 4; VI. 1-3.

Verein für Erdkunde (Leipsic). — *Mittheilungen*, 1892.

Verein für Erdkunde an der Universität Wien. — *Bericht über das XVIII. Vereinsjahr*.

OTHER EXCHANGES.

Rassegna delle Scienze Geologiche in Italia. — II. 1-3.

Revue Géographique Internationale. — Vol. XVII. 204-215.

White Mountain Echo. — XIV.-XV.

DONATIONS.

Revue Maritime et Coloniale, CXVI. 376.

Course of Lectures on Marine Algæ. W. H. Harvey. Gift of *Thos. Crozier*.¹

The Saugus Iron Works at Lynn, Mass. Gift of *F. N. Mudge*.

Outing, XXI. 4-6; XXII. 1-6; XXIII. 1-4. Gift of *Mrs. J. H. Thorndike*.

Royal Scottish Geographical Magazine, IX. 1-11. Gift of *Mrs. J. H. Thorndike*.

¹ Names of members of the Club are in italics.

Man and the Glacial Period. G. F. Wright. Gift of Mrs. J. H. Thorndike.

Topographic Surveys of States. H. F. Walling.

Report of Commissioners of Topographical Survey, for 1892.

Sparte et Les Gorges du Taygète. A. Martel. Gift of E. A. Martel.

Le Creux-de-Souci (Puy-de-Dôme). E. A. Martel. Gift of author.

Sur la Rivière Souterraine du Tindoul de la Vayssière, etc. E. A. Martel et G. Gaupillat. Gift of E. A. Martel.

En Ballon Libre! G. Gaupillat. Gift of E. A. Martel.

Second Report of the Forestry Commission of New Hampshire. Gift of J. B. Harrison.

Topographische Karte der Schweiz. G. H. Dufour. Gift of S. H. Scudder.

Alpine Journal, Vol. XVI. 119-122. Gift of Mrs. J. H. Thorndike.

Fourth Annual Report of the Park Commissioners of Lynn. Gift of N. M. Hawkes.

Florida: St. Augustine. Gift of Charles Eliot.

Results of Triangulation and Eleventh Annual Report of the New York State Survey. Gift of Charles Eliot.

United States Coast and Geodetic Survey: Methods and Results, 1886. Gift of Charles Eliot.

United States Coast and Geodetic Survey: Geodesy: Geographical Positions in Connecticut, App. No. 8. Report for 1888. Gift of Charles Eliot.

APPALACHIA, VII. 1, 2.

Register of the Appalachian Mountain Club, 1893.

The Journal of Geology, I. 1, 2.

Report of the Metropolitan Park Commission, Jan., 1893. Gift of Commission.

Land Office Map of Washington, 1891.

The Land of the Cliff-Dwellers. F. H. Chapin. Gift of Author.

The Moon's Face. G. K. Gilbert. Gift of Author.

Forty-first Annual Report of the Public Library of Boston.

Mountain Exploration. E. S. Balch. Gift of Author.

Check-list of the Plants of Gray's Manual. John A. Allen. Gift of W. H. Sylvester.

The United States, with an Excursion to Mexico. J. F. Muirhead. Gift of Author.

Transactions of the Technical Society of the Pacific Coast, X. 4-9.

Second Annual Report of the Trustees of Public Reservations. Gift of Trustees.

Malaspina Glacier. I. C. Russell. Gift of Author.

Catalogue of Flowering Plants, etc., near Hanover, New Hampshire. H. G. Jesup. Gift of Author.

Trees and Shrubs of New Hampshire. Wm. F. Flint. Gift of H. G. Jesup.

Elizur Wright's Appeals for Middlesex Fells, etc. Ellen Wright.
 Appendix to Bulletin for 1891 of the New England Meteorological Society
 and Astronomical Observatory of Harvard College, and United States
 Signal Service. Gift of Observatory.
 Proceedings and Transactions of the Nova Scotian Institute of Science,
 2d Ser. Vol. I. Part 2. Gift of Institute.
 The Picturesque Charles. Gift of *Quincy Pond*.
 Illustrated Guide-book to Mt. Tacoma.
 The Gypsy Moth: Special Report of State Board of Agriculture. Gift
 of State Board of Agriculture.
 Las Guillerías. D. Julio Serra. Gift of *R. Arabía y Solanas*.
 Boletín Inst. Geog. Argentino, XIV. 1-4. Gift of Inst.
 Annals of Astronomical Observatory of Harvard College, XXXI. 2;
 XL. 2. Gift of Observatory.
 Forty-eighth Annual Report of the Astronomical Observatory of Harvard
 College. Gift of Observatory.
 Der Bergsteiger im Hochgebirge. J. Meurer and J. Rabl, compilers and
 editors.

PURCHASED.

Keys to Genera and Species of Mosses. C. R. Barnes.
 At the North of Bearcamp Water. Frank Bolles.
 Die Alpenpässe.
 Illustrated Europe, 163 numbers in 82 vols.

Treasurer's Report for 1893.

THE officers in their several Reports have stated the cost of
 each Department and the use that has been made of the
 money; and in bringing the result of the operations of the
 Club into the Treasurer's accounts, only a short explanation
 is needed before presenting the figures.

The clearest idea of the extent of the year's operations and
 of the work accomplished, will perhaps be obtained from this
 statement from the accounts: We began the year with a bal-
 ance of cash on hand of \$1,067, and we close it with a balance
 of \$171. The items calling for large payments have been:
 the publishing of two numbers of APPALACHIA; effective and
 comprehensive work on the Club paths and camps; and the
 Art Exhibition in May. One large item of expenditure, of
 \$300, for an Observatory in Middlesex Fells, really belonged

to the previous year, as it was contracted for in 1892, and should have been completed and paid for in that year.

Six years ago the Club promised itself, by accepting the Treasurer's report, that it would before long realize practically the enjoyment of having invested funds, and use the income from them to assist in carrying on its work. At that time the annual interest was \$136, and it has gradually increased, until during the past year it has amounted to \$241. For the first time since the funds have earned interest a Council has decided to use this income; and it was therefore recently voted to request the Trustees to collect and pay it into the Club Treasury, — which has been done.

The following is a statement of receipts and expenditures :

RECEIPTS.

Cash on hand, Jan. 1, 1893	\$1,067.02	
Life-Memberships: John E. Kimball, Mrs. J. H. Thorndike, Walter B. Abbott, H. C. Parker, Mrs. Charles C. Stearns, Thomas T. Woodruff, J. Wesley Barber, L. M. Watson, Charles E. Lowe, Hubbard Hunt — 10 at \$30	300.00	
Admission fees :		
From 96 new members at \$5	\$480.00	
Assessments from 2 members for 1892.		
" " 636 " " 1893.		
Total . . . 638 " at \$3	1,914.00	
Interest for 1892 :		
On Permanent Fund	\$115.27	
On Reserve Fund	74.97	
		190.24
Interest for 1893		
On Permanent Fund	\$134.94	
On Reserve Fund	83.81	
On Treasurer's Bank account	22.91	
		241.66
Donations :		
From a member	\$1.25	
New Hampshire Forest Fund, contrib- uted through R. B. Lawrence	54.00	
Contributions for buying Sella Photo- graphs, contributed through C. E. Fay	399.25	
		454.50
Amounts carried forward	\$3,280.40	\$1,367.02

<i>Amounts brought forward</i>	\$3,280.40	\$1,367.02
Field Meetings and Excursions:		
From Excursion Committee	13.57	
APPALACHIA and other Publications:		
From sales ¹	20.97	
Total Income		<u>3,314.94</u>
		<u>\$4,681.96</u>

PAYMENTS.

To Trustees of the Permanent Fund,		
For 10 Life-Memberships	\$300.00	
Interest on the Fund for 1892, appropriated by the Club to the fund Jan. 11, '93	115.27	
		\$415.27
To Trustees of the Reserve Fund,		
Interest on the Fund for 1892, appropriated by the Council to the Fund January, 1893		74.97
		<u>\$490.24</u>
Postage and stationery		\$212.11
Printing and advertising	\$112.75	
Club Register for 1893	121.21	
		<u>233.96</u>
Clerical services		221.95
Expenses of meetings		188.75
Annual Reception		14.95
Library :		
For books	\$22.39	
For binding	36.71	
		<u>59.10</u>
Room, at No. 9 Park Street :		
For rent	\$400.00	
For rent of storeroom	48.00	
For care	45.00	
For gas	2.61	
For insurance on furniture and library, for five years	45.00	
For sundries	35.43	
		<u>576.04</u>
APPALACHIA, and other Publications:		
For Vol. VII. No. 1	\$463.77	
For delivery of the same	60.04	
For Vol. VII. No. 2	370.95	
For delivery of the same	47.00	
<i>Amounts carried forward</i>	\$1,506.86	<u>\$490.24</u>

¹ This does not include sales made by the sales agents, of which an account was not rendered previous to the auditing of the accounts of the Treasurer.

TREASURER'S REPORT.

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<i>Amounts brought forward</i> . . .	\$941.76	\$1,506.86	\$490.24
For 500 Middlesex Fells maps . . .	38.25		
For mounting maps . . .	33.25		
For sundries . . .	72.92		
		<u>1,086.18</u>	
Department of Improvements :			
Observatory in Middlesex Fells, per contract in 1892 . . .	\$300.00		
For paths on N. H. mountains . . .	308.85		
For Carter Notch Path . . .	50.00		
For repairing Madison Spring Hut . .	15.30		
For repairing Passaconaway Lodge and Path . . .	10.00		
		<u>684.15</u>	
Department of Art:			
Cost of Sella Exhibition at Art Club			
Rooms . . .	\$456.42		
Less by sale of catalogues . . .	232.10		
	<u>\$224.32</u>		
Purchase of Sella Photographs . . .	440.13		
		<u>664.45</u>	
Donation:			
To Trustees of Public Reservations . . .	25.00		
		<u>3,966.64</u>	
Total expenses . . .			<u>\$4,456.88</u>
Balance, Club Funds . . .	\$171.08		
New Hampshire Forest Fund . . .	54.00		
		<u>225.08</u>	
			<u>\$4,681.96</u>

Respectfully submitted,

JOHN E. ALDEN,
Treasurer.

Boston, Jan. 8, 1894.

The undersigned have examined the accounts of the Treasurer of the Appalachian Mountain Club, for the year 1893, and believe them to be correct. We found proper vouchers for all payments, and verified the cash on hand, amounting to \$225.08.

CHARLES B. CUMINGS, }
CHARLES C. HALL, } *Auditors.*
GEORGE W. THACHER, }

RECEIPTS FOR FIRST EIGHTEEN YEARS.

YEAR.	MEMBERSHIP.					Life Membership.	Sales of APPALACHIA and other publica- tions.	Interest.	Annual Reception.	Field Meetings and Excursions.	Donations.	Total.
	Admission Fees.	Yearly Assessments.	Back Assessments.	Advance Assessments.	Total.							
1876	252.00	.....	.....	.....	252.00	.....	43 13	.....	.....	.....	.....	295 13
1877	50.00	254.00	8.00	.....	312.00	.....	59.00	.....	.....	.....	.....	410.00
1878	54.00	254.00	.....	.....	318.00	60.00	75.70	.....	.....	.....	43.00	496.70
1879	148.00	252.00	40.00	4.00	444.00	.....	130.45	1.90	.....	.....	221.70	802.45
1880	178.00	322.00	24.00	4.00	538.00	90.00	116.90	10.79	.....	.....	86.21	841.90
1881	222.00	324.00	18.00	12.00	636.00	120.00	141.40	17.58	.....	.....	62.55	977.54
1882	256.00	328.00	74.00	.....	858.00	90.00	309.43	22.07	.....	.....	2.00	1281.50
1883	336.00	1000.00	20.00	27.00	1442.00	210.00	197.58	39.72	9.72	82.88	22.00	2003.90
1884	285.00	1659.00	21.00	9.00	1374.00	60.00	93.51	53.29	26.90	11.47	1.00	1620.07
1885	375.00	1212.00	69.00	12.00	1668.00	60.00	113.19	61.09	45.00	70.73	684.50	2507.96
1886	426.00	1317.00	90.00	24.00	1857.00	350.00	247.94	88.62	12.50	124.35	364.20	3024.61
1887	385.00	1491.00	90.00	42.00	2008.00	180.00	183.90	79.34	10.00	40.20	114.00	2615.34
1888	385.00	1535.00	117.00	12.00	2220.00	180.00	67.00	42.52	9.20	45.94	754.76	3119.48
1889	655.00	1617.00	69.00	27.00	2388.00	120.00	93.85	151.29	11.38	.....	127.00	2872.22
1890	450.00	1620.00	24.00	15.00	2109.00	150.00	1168.13	217.12	3.73	.....	220.85	3868.83
1891	500.00	1743.00	12.00	9.00	2264.00	120.00	854.95	182.54	.....	148.27	20.00	3087.09
1892	560.00	1830.00	15.00	9.00	2414.00	300.00	625.22	130.29	.....	70.58	.50	3540.69
1893	480.00	1608.00	6.00	.....	2394.00	300.00	20.97	431.90	.....	13.57	454.50	3614.94
Total	9028.00	18551.00	697.00	206.00	23380.00	2370.00	4080.94	1580.07	83.88	605.99	3029.37	36060.25

1 Including \$3.00 for keys.

EXPENDITURES FOR FIRST EIGHTEEN YEARS.

YEAR.	Permanent Fund.	Reserve Fund.	Stationery, Postage, and Printing.	APPALACHIA and other Publications.	Department of Topography.	Improvements and Explorations.	Natural History and Art.	Clerical Expenses.	Expenses of Meetings.	Library.	Club Room.	Donations.	Total.
1876	...	...	109.91	140.86	...	15.00	...	...	...	...	...	...	265.77
1877	...	...	60.65	354.18	...	2.00	13.45	...	...	...	...	...	430.23
1878	...	...	292.31	169.80	...	20.00	52.48	...	...	...	...	...	444.59
1879	60.00	...	162.31	347.92	19.20	155.78	...	...	...	...	...	...	745.19
1880	90.00	...	196.17	318.13	19.00	72.60	...	...	...	...	...	...	685.90
1881	120.00	...	394.09	246.23	37.95	68.00	...	19.75	22.70	...	...	...	948.72
1882	90.00	...	258.69	675.93	25.40	...	...	84.50	25.00	...	...	...	1199.82
1883	261.72	...	389.73	368.27	23.65	190.37	...	67.41	1.38	69.78	...	...	1306.31
1884	113.42	...	382.49	1176.53	...	21.00	...	57.62	...	68.10	...	...	1800.15
1885	86.48	...	303.27	361.31	220.00	102.00	...	106.00	59.06	72.50	264.17	25.00	1682.79
1886	270.00	...	432.38	932.91	77.73	46.00	74.00	121.45	171.15	131.72	667.30	49.88	2974.52
1887	358.38	1000.00	289.38	569.71	538.97	123.02	20.12	107.12	145.45	102.50	504.81	...	3766.46
1888	290.00	100.00	473.95	597.60	...	779.55	9.32	49.50	92.45	120.56	456.12	...	2869.04
1889	220.00	114.70	370.77	1127.91	7.20	118.58	86.78	123.75	68.88	67.33	487.34	...	2813.20
1890	253.48	48.50	463.43	1682.95	...	46.07	101.56	181.00	58.35	96.06	464.95	...	3426.44
1891	305.64	605.71	389.27	833.17	50.00	123.00	45.36	191.50	121.60	117.10	471.69	105.87	3350.34
1892	339.56	200.00	438.72	1069.89	216.33	46.60	122.39	197.50	193.95	113.45	534.08	61.84	3619.81
1893	415.27	74.97	446.07	1086.18	...	684.15	664.45	221.95	203.70	59.10	576.04	25.00	4456.88
Total	3403.95	2143.97	5683.89	12064.42	1246.43	2684.70	1188.89	1479.06	1098.65	1008.20	4446.50	286.52	36756.17

Report of the Trustees of the Permanent and Reserve Funds for 1893.

PERMANENT FUND.—PRINCIPAL.

1893.

January 11.	Amount on deposit in Suffolk Savings Bank	\$1,428.10	
	Amount on deposit in Provident Institution for Savings	1,103.34	
	Amount on deposit in Lexington Savings Bank	572.51	
			\$3,103.95

Amounts received from J. E. Alden, Treasurer, for Life-Memberships during the year :

March 11.	John E. Kimball	\$30.00	
" "	Walter B. Abbott	30.00	
" "	Mrs. J. H. Thorndike	30.00	
" "	Herschel C. Parker	30.00	
" "	Mrs. Charles C. Stearns	30.00	
May 3.	T. T. Woodruff	30.00	
June 3.	J. Wesley Barber	30.00	
December 6.	Charles E. Lowe	30.00	
" "	Hubbard Hunt	30.00	
" "	Laban M. Watson	30.00	
			300.00
	Total Principal on hand Jan. 10, 1894		<u><u>\$3,403.95</u></u>

PERMANENT FUND.—INTEREST.

Interest on deposit in Suffolk Savings Bank for six months to April, 1893	\$28.56
Interest on same for six months to October, 1893	29.12
Interest on deposit in Provident Institution for Savings for six months to January, 1893	22.06
Interest on same for six months to July, 1893	22.50
Interest on deposit in Lexington Savings Bank for six months to April, 1893	18.55
Interest on same for six months to October, 1893	<u>19.15</u>

Total Interest on Permanent Fund received for the year, and paid to the Treasurer of the Club according to vote of the Council, Dec. 11, 1893

\$134.94

TRUSTEES' REPORT.

RESERVE FUND. — PRINCIPAL.

1893.

January 11.	Amount on hand as per last account, loaned to Massachusetts Loan and Trust Co.	\$1,366.37
	On deposit in Five Cents Savings Bank	<u>777.60</u>
	Total principal on hand Jan. 10, 1894	<u>\$2,143.97</u>

RESERVE FUND. — INTEREST.

Interest on deposit in Five Cents Savings Bank for six months to April, 1893	\$13.54
Interest on same for six months to October, 1893	15.82
Interest on Loan to Massachusetts Loan and Trust Co., one year, to Jan. 1, 1894, at 4%	<u>54.45</u>
Total Interest on Reserve Fund re- ceived for the year, and paid to the Treasurer of the Club according to vote of the Council passed Dec. 11, 1893	<u>83.81</u>

The amounts in the hands of the Trustees are there-
fore the same as they were at the beginning of
the year, with the addition of \$300 to the Per-
manent Fund from Life-Membership, viz. :

Permanent Fund	\$3,403.95
Reserve Fund	<u>2,143.97</u>
Total amount in the hands of Trustees	<u>\$5,547.92</u>

ISAAC Y. CHUBBUCK,	} Trustees.
REST F. CURTIS,	
CHARLES H. FRENCH,	

BOSTON, Jan. 10, 1894.

Reports of the Councillors for the Autumn of 1893.

Art.

BY ELIZABETH H. DENIO.

THE notable events of the year in the Department of Art have been the exhibition of the Sella Collection of Alpine and Caucasian photographs, and the purchase of the same by subscription for the Club.

Without doubt this collection, numbering some five hundred subjects, is one of the largest and finest ever seen in America. They differ from most mountain photographs in being largely taken from extremely high points, and in this, as in their superb technique, testify to Mr. Sella's skill both as a mountaineer and as a photographer. Several form panoramas; others are details of the upper portions of high mountains; and all combine to present a marvellous world of snow and ice, of crag and crevasse, of regions lonely, vast, and most fascinating. Old travellers quite familiar with the Alps thrill again as they see these pictures, and recall experiences in the Matterhorn, Mont Blanc, or Mont Rosa; all behold a hitherto unknown world of sublimity and beauty in the Caucasian mountains, while delighting in the infinite gradations of color, the magnificent cloud effects, the marvels of rock-structure in these perfect reproductions of Nature.

By the courtesy of the Boston Art Club, the exhibition was held in its gallery, the use of which was granted from May 6 to 24. These beautiful and commodious quarters insured the success of the exhibit, so far as it depended upon the number of visitors. It was visited and enjoyed by about nine thousand persons.

The interest thus aroused led to the sending out to members of the Club of a circular, dated May 17, 1893, asking for contributions to a subscription which had already been started. The response was immediate and generous; and before the close of the year, the final steps will have been taken to make the collection the property of the Club.

Since the close of the Exhibition at the Art Club, separate sections have been on exhibition at Mr. Charles Pollock's on Hamilton Place, in whose custody they remain for the present, awaiting the adoption of a plan for their arrangement at the Club room in such a way that they may be studied and enjoyed without injury. Meantime it is hoped to arrange for their exhibition in other cities.

The thanks of the Club are due, first of all, to the Art Club for its hospitality; then to Mr. Sella for such consideration as made the purchase possible; to those who contributed to the fund; and particularly to Mr. W. O. Witherell, by whose kindness a series of photographs of the several sections of the Exhibition was made and presented to the department.

As in former years, members of the Club have contributed photographs from their own cameras to our increasing collection, some of which have been mounted in albums.

Reports of the Councillors for the Autumn of 1893.

Exploration.

BY ARTHUR L. GOODRICH.

OF late years the reports of the Councillor of Exploration have been extremely meagre. This will or will not seem strange to the reader according to the extent of his information regarding the ground originally to be covered and the work done in past years. The Club commenced its work eighteen years ago, and one of its objects was "to explore the mountains of New England." That it has attended to and substantially accomplished this object must, I think, be quite evident to those who have read APPALACHIA or who are familiar with the recent editions of Sweetser's Guide to the White Mountains.

There are extremely few summits or points of notable importance in New England which have not been visited and described by members of the Club. Future explorations must be limited to one or the other of two fields: (1) summits and other points of interest outside of our special field of New England; or (2) details of topography in our Club

domain,—that is, the course of streams, the position of minor elevations and ridges, the situation of ponds, etc.

The Councillor will deem it a favor if all who visit summits of mountains or other points of interest among mountains anywhere will send him accounts of the same. But to the second item he wishes to call special attention. While all the main summits and most of the minor ones in the White Mountains have now been thoroughly described, there is very little accurate knowledge regarding the ridges, valleys, and streams radiating from their summits, and our Club maps cannot be made reliable until this knowledge is acquired. The positions of the larger streams are known, to be sure; but the head-waters, the smaller streams which unite to form the larger, with their intervening ridges, are located upon all maps very much at random, and in many cases erroneously.

This seems, perhaps, like asking the members of the Club to attend to trivial things; but as a matter of fact, these are the details most difficult to settle. It requires patience and some little skill. Both these qualities exist in abundance in the Club, and therefore I appeal a second time to the members for information on this head. Do not consider anything too trivial which will help in settling these points. Our maps will be deceptive and a source of complaint till they can be made correct in these particulars.

It may seem to some that in these matters the Department of Exploration is infringing on that of Topography, but in fact these departments supplement each other. All topographical information will be turned over for use in that department, and accounts of the explorations will be published by the Department of Explorations.

Visitors to mountain summits can make a record of the compass bearings of ridges and minor elevations; fishermen can notice the general trend and decided changes of course in the brooks they follow; and individuals, or groups of individuals, can easily determine the details for the whole of their locality. The collation of such items will assist us materially. That such work will be a source of great interest and pleasure to those taking it upon themselves, the writer can assert with confidence from his own experience in the Waterville Valley.

Reports of the Councillors for the Autumn of 1893. Improvements.

BY RICHARD B. GROVER.

IN presenting this report for the Department of Improvements, it gives me very much pleasure to say that a somewhat unusual amount of work has been accomplished during the year, owing in part to the fact that the Council at the beginning of the year placed a very generous appropriation at the disposal of the department.

Early in the year a committee, consisting of several ex-members of the Council, was appointed to assist the Councillor in determining, if possible, some settled rules that should govern the department in its expenditures, and to recommend to the Club some definite policy to be pursued in the future.

The Committee so appointed held a number of meetings, and carefully went over the history of the department, to see what policy, if any, had obtained in the past. But the more they investigated, the more deeply they seemed to find themselves in the dark regarding the matter, and it was finally concluded that each preceding Councillor was undoubtedly such a wise mountaineer that he had been able to make his own policy, and that therefore no settled policy had been followed.

It was then proposed that the department, in conjunction with the Department of Topography, should issue a map of the whole White Mountain region, upon which all the paths, camps, and huts of the Club should be located, and their condition indicated each year. To carry out this plan an investigation was instituted to find out what paths might properly be claimed by the Club; and it was discovered that quite a large number of these paths were sailing under false colors, so to speak,—that is, paths were being claimed by the Club upon which it really had no claim whatever, never having accepted them or expended a dollar to maintain them. Some of them, for example, had been opened and maintained wholly at the

private expense of members of the Club, and because of this fact, they had been reported as Club paths, — a course which in the early days no doubt seemed perfectly legitimate and proper. The Club was young and therefore inexperienced, the membership much smaller than at present, and the coffers not so well filled; and hence the individual work of the members passed for Club work. As no objection seemed to arise to this course for some time, the Club's name very naturally became associated with various paths, and finally they were being wholly claimed by the society, and its good name was suffering in consequence.

A correspondence was at once entered into with several members, especially Mr. Peek, Mr. Cook, Mr. Watson, and Mr. Lowe, who had been so largely instrumental in developing the interesting network of paths in the Jefferson and Randolph region. All were found to be very cordial in their support of the suggestions offered by the Committee, that the Club should assume their paths and keep them in order for the future; and the result was that a number of paths were generously turned over to the control of the Club.

It was then voted by the Committee that a recommendation should be presented to the Club, embodying the thought that, in the judgment of the Committee, the time had fully come when the Council itself should take some special action in regard to the acceptance or abandonment of paths bearing the Club's name. Then, with all the paths, huts, camps, and shelters located on the proposed map and their condition indicated, succeeding Councillors, as they came into office, would be able to know something of the definite work required by the department, and the policy of the Club would be clearly outlined. The feeling was also expressed that if this map (revised each year) could be framed and distributed among all the better class of hotels in the mountains, a new interest might be awakened in the work of the Club, and a new impetus given to mountain climbing.

To carry out the details called for by the above plan, a large share of the appropriations for the year were expended.

The following paths were put in order during the year, most of the work being done before the month of July: —

1. The " Air Line Path " to Mt. Adams *via* Durand Ridge, with branch through King's Ravine to the Gateway.
2. The " Lowe Path " to Mt. Adams, with branches to Montevideo, the Cliff, and Ravine of Cascades.
3. The Ravine of the Cascades Path.
4. The Castellated Ridge Path, from the forks at the head of the Israel River.
5. The Ice Gulch Path.
6. The Carter-Moriah Path, from Gorham to Carter Notch.
7. The Carter Notch Path, from Jackson.
8. The Tuckerman's Ravine Path.
9. The Mt. Willey Path.
10. The Mt. Carrigain Path.
11. The Moat Mountain Path.
12. The Livermore-Waterville Path.
13. The Black Mountain Path (Waterville).
14. The Liberty-Lafayette Path.
15. The Twin Mountain Path.

The Councillor paid out for this special work the sum of \$204.45. This seemingly large expense was partly due to the fact that lumbering operations had greatly obstructed some of the paths, rendering it necessary to re-locate portions of them, and also to the fact that a number of them had not been cleared for many years.

The Twin Mountain Path has been partly re-located. It now follows the Little River Lumber Railroad till the fourth bridge is crossed ; near the bridge it follows a side track to the right, and at the end of the siding a guideboard indicates the path through the forest to the summit of the North Twin.

The Gorham end of the Carter-Moriah Path, which had been utterly neglected for many years, is now indicated by a guideboard on the right side of the highway opposite the " Hitchcock Farm " (just below Gorham village), where it enters a pasture and follows up the slope, passing over Mt. Surprise, and then on over the ridge.

The Mt. Willey Path is indicated by a guideboard placed about eight or ten rods south of the eighty-third mile-post on the Maine Central Railroad, in the vicinity of the Willey House.

I am happy to report that a new camp has been erected in Carter Notch, to take the place of the old one burned in the

winter of 1892. "Passaconaway Lodge" has been much improved, and the path thence to the summit of the mountain put in excellent order, the President of the Club kindly looking after all the details. A new camp has also been built in Tuckerman's Ravine.

This last, which is reported to be most comfortable and commodious, has been presented to the Club by a fellow-member, Mr. Francis Blake. It was built at his request by Mr. Milliken of the Glen House, some of whose guests with members of the Club assisted in its dedication early in July. The hearty thanks of the Club are due to Mr. Blake for his most generous gift, which I am sure will be deeply appreciated by all who find themselves ensconced within its walls.

Your Councillor regrets to report that the refuge Hut at Madison Spring seems to need some important repairs, though how extensive he is unable to say. A large crack on its west side would perhaps indicate that the frost had unsettled the foundations somewhat, and thrown the wall out of plumb. This crack has been filled, and the walls repainted with Portland cement; and this may prove to be all that will be necessary, though he recommends that a careful examination of the structure be made another year. Sanitary arrangements have been inaugurated, looking toward the preservation of the spring from contamination.

Your Councillor would recommend that the Hut be furnished with a new and somewhat larger stove, also that a sufficient line of cooking-utensils and table-ware be secured. The large use now made of the refuge seems to make this a necessity. Several sets of blankets might likewise be supplied.

One or two more recommendations may perhaps be in order here. It seems desirable that the Glen House side of the Carter Notch Path should be re-located, owing to the extensive lumber operations now in progress in the section traversed by the present path. The new one might follow for a large part of its distance the logging-roads of the Nineteen Mile brook, and for the last half or three fourths of a mile mount directly to the summit of the col. This would make a much easier route, one that could readily be kept in order and at a very small expense.

It might also be well to establish a men's shelter in the col between Mt. Adams and Mt. Jefferson, furnishing it with a few cooking-utensils. This would be of great value to those making the trip over the northern peaks.

In closing, the thanks of the Councillor are due to all members of the Club who have so kindly co-operated with him during the year, and to Mr. C. E. Gale, of Jackson, and Mr. A. E. Stevens, of Bartlett, N. H., who have rendered much valuable assistance.

Report of the Excursion Committee for 1893.

THE Excursion Committee for 1893 have the pleasure of reporting a year of continued interest in the out-door life of the Club, as shown by the attendance on the various excursions, and the willingness of members to assist in conducting them. The year has been peculiar in the large number of stormy Saturdays, — not less than fourteen. The Fast Day trip to Pegan Hill had to be given up, though the same ground was covered on a later date; the May Walk to Gloucester had to be postponed; and twelve Saturday outings had to be abandoned, though in a few cases shorter walks were substituted. There have been during the year six excursions, thirty-six outings (seven of them occupying the whole day), and one snowshoe excursion.

On April 22, the day of the Mayflower Walk, PLYMOUTH, MASS., was visited by a party of eighty-eight, under Mr. Chandler. Although the day opened very doubtfully, it proved one of the best, and was much enjoyed.

On May 20 the May Walk took place; a party of sixty-seven, under the leadership of Mr. C. C. Hall, visiting Mt. ANN in West Gloucester.

From May 27 to the 31st the Decoration Day trip was made to WILIAMSTOWN, MASS., under the charge of Messrs. Carret and Hardwick. The party numbered forty-six. Forty ascended Greylock, twelve riding all the way to the top, the rest ascending by the path through the Hopper, and descending on the east side. A ride was also taken to Berlin Mountain, and a walk over Bee Hill. Other short walks were taken, and a visit was made to the College buildings.

The Field Meeting was held at the Waumbek House, JEFFERSON, N. H., from July 1 to the 8th. The party numbered eighty-nine, and was favored by good weather and by excellent treatment at the hands of the hotel proprietors and the Concord and Montreal Railroad.

Excursions were had on every day of the week, as follows: Monday, July 8, Mt. Starr King (20); Tuesday, 4th, Mt. Adams, by way of the Durand Ridge and the Club hut (28); Wednesday, 5th, Owl's Head (20); Thursday, 6th, the Percy Peaks (34); Friday, 7th, North Twin Mountain (13). Drives and walks were taken to Prospect Mountain, the Lost Nation, Randolph, Lancaster, and other interesting points. The party returned to Boston on Saturday; but a larger number than usual remained over Sunday and some days thereafter, several going up Mt. Adams on Saturday as far as the Cascade Camp. The field meeting proper occurred on Wednesday evening, and was devoted to a discussion of the forestry question. The committee consisted of Professor Fay, Mr. Curtis, and Mr. W. H. Sylvester.

Between July 8 and the 24th three camping-parties, numbering respectively seven, eight, and nine, visited, by invitation of Mr. J. R. Edmands, his camps on Mt. ADAMS, spending there about four days each. The great advantages of these comfortable camps in very desirable locations were highly enjoyed by the members of the parties, and a number of excursions were made to the various points of interest on Mt. Adams and over the great range.

On October 4th, the autumn excursion, of one week, was made, under charge of Mr. Ritchie, to ASHFIELD, MASS. There were twenty-six in the party; and trips were made to More's Hill, Parker Hill, the Bryant Place in Cummington, Mt. Owen, and Plainfield.

A supplementary trip was made, by sixteen of the party, to Conway, Mass., October 10-15. Trips were made to Field Hill, the Ravine and Creamery, Whateley Glen, South River Ravine, and Prospect Hill.

The all-day outings were as follows: May 30, Pegan Hill, Natick; June 17, Gloucester; July 22, Rockport; August 19, Eastern Point, Gloucester; September 4, Sharon; October 21, Wayside Inn and Nobscot Hill; November 7 (Election Day), Prospect Hill and Arlington Heights.

Thirty-two members and friends took part in the snowshoe excursion to WOODSTOCK, VT., on February 18-27. Ascents were made of Mt. Ascutney, Mt. Tom, and Garvin Hill. Sixteen or eighteen walks and rides were taken by the party during the trip. There were three or four feet of snow on the ground. Snowshoes were used on four of the outings.

The number of members and friends on the outings was 1,251; on the excursions, 340; whole number, 1,591. Average on the outings, 35; on the excursions, 57.

The financial report of the Treasurer of the Committee is appended herewith, showing the receipts and expenditures during the year, with a balance in cash of \$13.57, which has been turned over to the Treasurer of the Club. The larger part of the present assets, however, are shown in

the shape of railroad tickets on the various roads out of Boston to the value of \$95.90.

The Reports of the Custodian of the property in the hands of the Committee, and also of the Outing Committee, have been submitted to the Council.

The Committee have had nine meetings. Among the subjects of general policy that have been discussed may be mentioned, for the consideration of future Excursion Committees :—

1. The desirableness of continuing the Saturday outings during the summer months.
2. The limiting of the number of the larger excursions.
3. The discontinuance of "laurel" or "mayflower" excursions, as being perhaps opposed to the policy of the Club in fostering the preservation of the natural beauties of the country.

REST F. CURTIS,	} <i>Excursion Committee for 1893.</i>
WALTER B. ABBOTT,	
JAMES R. CARRET,	
GEORGE L. CHANDLER,	
CHARLES H. HARDWICK,	
GEORGE C. MANN,	

Proceedings of the Club.

October 11, 1893. — One Hundred and Fortieth Corporate Meeting.

President Fay in the chair.

Forty-six persons were present. In the absence of the Recording Secretary, Captain J. A. Palmer was unanimously elected Secretary *pro tem*.

The records of the previous meeting and of the July Field Meeting were read and approved.

Thirteen candidates for Corporate Membership were elected.

While the election was taking place, the President called the attention of the Club to that part of the record of the July Meeting which bore reference to the preservation of the New Hampshire forests; he said that perhaps it might not be fully appreciated how great a power the Club had become in such movements, how much courage it gave to our associates in New Hampshire to know that we were behind them in this good work, and closed his remarks by hoping that members would fully realize that the Club, besides being a source of pleasure, was an instrument of public good.

The President then spoke of the presence of one of the original members of the Club, one to whom it owed much for past services, Professor

W. H. Pickering, who had been absent for the past three years in South America, and wished in the name of the Club to give him a cordial welcome; to which Professor Pickering responded by brief and appropriate remarks.

Miss M. A. J. Frothingham read a paper by Rev. H. P. Nichols, entitled "Back Ranges of the Selkirks," British Columbia (see p. 101), at the close of which the President, after inviting comments from others, confirmed the descriptions of the writer from his own experience in the same locality.

Rev. E. P. Baker then presented a paper entitled "Experiences among the Hawaiian Volcanoes." Mr. Baker said that he should not attempt to read a formal essay, but should simply make some remarks upon his own experiences in the volcanic regions of the Sandwich Islands. This he did in a most interesting and eloquent manner, giving to the Club much original and valuable information, especially regarding the various forms of lava.

Professor George H. Barton made some remarks, fully confirming from his own experience in the Islands the opinions and facts narrated by the previous speaker.

Mr. Baker rejoined that the Club must remember that volcanoes were becoming extinct upon the surface of the earth, and that he hoped the members would make it a point to come at no distant day and visit those of Kilauea and Mauna Loa.

Professor W. H. Niles moved the thanks of the Club to Mr. Baker, which motion was unanimously carried.

The members having been invited by Mr. Baker to inspect his photographs and specimens which were upon the desk, the meeting was adjourned.

November 15, 1893. — One Hundred and Forty-first Corporate Meeting.

President Fay in the chair.

One hundred persons were present. Eleven candidates for Corporate Membership were elected.

It was voted to request the President to appoint a committee to nominate officers for the ensuing year, a committee to audit the Treasurer's accounts, and a committee on the Annual Reception.

The report of the Councillor of Art, giving an account of the Sella exhibition, was read by the Recording Secretary. (See p. 261.)

The Councillor of Topography presented an oral report, stating that a map of the White Mountains, showing paths, was under way, that a new edition of the Boston map with changes was in contemplation, and that the appearance of the first sheet from the United States Geological Survey in the White Mountain region had an important bearing upon our Club work.

Voted that the reports be received and placed on file.

Professor George L. Goodale gave an illustrated lecture on "The Mountains of Australasia." The speaker described the situation, physical characteristics, scenery, and vegetation of Australia, Tasmania, and New Zealand, and illustrated his remarks with a very large collection of fine stereopticon views. In reply to questions he also spoke concerning the aborigines.

November 27, 1893. — Special Meeting.

President Fay in the chair.

About one hundred and twenty-five persons were present.

Mr. Philip S. Abbot gave a paper entitled "The Rothhorn on the Western Side, and the Gabelhorn." The difficulties and dangers of these ascents were brought out, and the grand scenery was illustrated by stereopticon views. (See p. 212.)

Previous to the paper, a fine view of the Himalayas from Darjeeling was thrown upon the screen, and interesting remarks upon the region were made by Protap Chunder Mozoomdar, of Calcutta.

Mr. Mozoomdar said that Darjeeling is situated on the spur of a great range of hills about 6,500 feet above the sea. A railroad from Calcutta has brought this mountain resort to within twenty-four hours of the metropolis of British India. The town is in the centre of the great semi-circle of the snowy range. From it you see the summits of some of the highest peaks of the Himalayas, among them Kinchinjunga 27,000 feet high. By going a little farther up the hill back of the town, one sees Mt. Everest, which is over 29,000 feet high. By going up about eight miles on a pony, you can see other great snow-peaks rising one above another, almost all of them equally high. It is supposed that some of these are higher than Everest. Those farthest away have dome-like summits instead of sharp peaks. It is about nine days journey from Darjeeling to the snows.

Darjeeling is the seat of the government of Bengal from April to November, excepting in June and July, when the rains are worst. During this season the mountains are not visible, but if one happens to be there from the 15th of October to the 15th of December he has the very best of scenery. The average temperature ranges in summer from fifty-five to seventy-five degrees. It is a very interesting place, when the peaks are visible; but when tourists from England and America are there, it is apt to be in the damp season. The climate is very uncertain. Sometimes the peaks are hidden for days and weeks together. The fog, which is almost as solid as a London fog, hangs like a funeral pall. The climate is not dry, for the rain-fall here is about 140 inches annually. One great annoyance is the enormous number of leeches which come with the damp weather. Hundreds of thousands of them cover the ground at very great elevations; they crawl into your boots and socks, and are in general very troublesome.

The beautiful butterflies are an interesting feature of Darjeeling. At about this time of the year you find, along with the leeches, a great number of little worms all covered with sharp spines. They crawl by hundreds of thousands around you ; but in summer all these become butterflies, and the industry of catching them is immense, and is exceedingly profitable. People have been known to gather these butterflies and sell them in England for something like £50 a box. Some exhibit the most beautiful varieties of colors and shades. To find the best specimens one must travel into the interior.

The vegetation farther north is entirely European, with the pine, the rhododendron, the oak, the elm, the horse-chestnut, the apple and pear, and all the delicious productions of our own climate. At Darjeeling you do not find European vegetation ; but a peculiar species of pine grows there, and much of the vegetation is neither tropical nor temperate, but of a kind peculiar to the place.

The inhabitants present all Mongolian types ; many of them are Tibetans, many are Nepalese. They have flat noses, oblique eyes, and high cheek bones. The Nepalese are Hindoos ; the others are all Buddhists. The real Mongolians are exclusively Buddhists. Although Buddhists protest against flesh-eating, there is no flesh that these people do not eat ; they are exceedingly fond of pork and all kinds of animal food. They are immense men, very strong, but they are never taken into the army of the British Government or into the native police, because they are generally believed to be dishonest and untrustworthy.

December 18, 1893. — One Hundred and Forty-second Corporate Meeting.

President Fay in the chair.

One hundred persons were present. Eleven candidates for membership were elected.

The President appointed the following committees: Auditing Committee, C. B. Cumings, C. C. Hall, G. W. Thacher ; Nominating Committee, A. S. Parsons, G. L. Chandler, Mrs. J. H. Thorndike, Miss M. A. J. Frothingham, and A. S. Lynde.

The President announced the death of Professor Tyndall, the first foreign Honorary Member of our Club, and stated that further notice would be taken at a future meeting.

Professor William H. Pickering presented an illustrated paper, "A Climb in the Cordillera of the Andes." (See p 205.) He described the different ranges, and by map showed the position of Pichu-pichu, 18,600 feet, Misti, 19,200 feet, and Chachani, 20,000 feet. The ascent of Misti was minutely described, and the phenomena of mountain sickness carefully dwelt upon. Fine stereopticon views were shown of Arequipa and the Boyden Observatory (elevation 8,060 feet), of the camp on Chachani 16,000 feet), of the three great mountains, and the crater of Misti.

Professor Pickering stated that Aconcagua is in Argentine, and that the highest mountain on the American continent is probably Illyampu, about 24,000 feet.

Mr. A. Lawrence Rotch told of his visit to the camp on Chachani, and said that he thought the subject of mountain sickness merited careful investigation.

December 29, 1893. — Special Meeting.

President Fay in the chair.

In pursuance of a long contemplated plan to invite the public to be present at a meeting of the Club, the hall of the Young Men's Christian Association Building was engaged for an evening meeting, and a general invitation was extended through the press to attend the lecture of Professor I. C. Russell on "Mt. St. Elias and the Malaspina Glacier." Some five hundred persons were present.

In introducing the lecturer the President took occasion to call attention to the extent to which the Appalachian Mountain Club fills in Boston the place of a geographical society, particularly as shown in the character of the papers presented at its meetings. Thus, merely since February last, the topics treated have compassed the globe on both sides of the equator.

Professor Russell began by explaining, with the aid of a map of large scale, the district covered by his explorations of 1890 and 1891. He showed his first approach to Mt. St. Elias from the south from Disenchantment Bay and by way of Blossom Island; this name was given to a rocky tract rising through the ice-sheet, and covered at that season with a profusion of blossoming plants. Thence the route lay across the Malaspina and subordinate glaciers to a high camp, some 8,000 feet above sea-level. The difficulty of the expedition lay principally in the absence of all fuel, save the oil they carried for the purpose, as nearly all their camps had to be made above timber line. The failure of the first expedition was due to the lack of supplies. Professor Russell described with modesty and a fund of humor his dangerous stay alone in a chamber which he had dug in the hard-packed névé just before his tent was crushed in by the accumulating snow of a severe blizzard; this occurred while awaiting in their highest camp the return of his sole companion to this elevation, who had gone back on their track for supplies. This storm was the immediate cause of their first failure.

The second expedition chose a different route of approach, yet to the same side of the mountain as before. The peak is a monoclinal mountain, with its steep side turned to the south. This rises almost vertically 16,000 feet of its entire 18,000 of altitude. The northerly slope is gradual and comparatively easy of ascent. Reaching their high camp of the year before by way of the Chaix Hills, they pressed beyond it to an elevation of 14,500 feet. To have reached the summit from this point would have been quite feasible; but the necessary exertion, in addition to the great

expenditure of time and strength that had been required to get from their last camp to where they were, made it certain that they would never be able to retrace their steps. Hence the second attempt was abandoned.

Professor Russell expressed his belief in the feasibility of scaling the peak; it is simply a question of getting fuel and supplies to a camp sufficiently high to render it possible to make the trip from it to the summit and back in a single day. Frequent stormy weather is a serious drawback, for the quantity of supplies to be taken to the highest camp must be large. Some forty views of the peak and its glacial surroundings were shown, many of them exceedingly fine. The discussion of the geological features was also of the greatest interest, and several of those present availed themselves of the lecturer's invitation to ask questions.

After the close of the lecture an informal reception was held, during which many members of the Club were presented to Professor Russell and enjoyed the privilege of questioning him still further.

January 10, 1894. — One Hundred and Forty-third Corporate (Annual) Meeting.

President Fay in the chair.

Sixty-five persons were present.

Six candidates for Honorary, fifteen for Corresponding, Membership were elected, as follows: For Honorary Membership: George M. Dawson, Ottawa, Ontario; Albert Heim, Zürich, Switzerland; Joseph Dalton Hooker, Sunningdale, Berkshire, England; J. Scott Keltie, London, England; Ferdinand von Richthofen, Berlin, Germany; Israel C. Russell, Ann Arbor, Mich. For Corresponding Membership: Frederick H. Chapin, Hartford, Conn.; Joseph S. Diller, Washington, D. C.; William Spotswood Green, England; Julius Hann, Vienna, Austria; C. Willard Hayes, Washington, D. C.; Gardiner G. Hubbard, Washington, D. C.; A. Kirchoff, Halle, Germany; Joseph LeConte, Berkeley, California; Élisée Reclus, Paris; Friedrich Simony, Vienna, Austria; J. B. Walker, Concord, N. H.; Edward Whymper, England; W. W. Graham, England; W. M. Conway, England; Angelo Heilprin, Philadelphia.

Eight candidates for Corporate membership were also elected.

The President appointed the following Committee on Annual Reception: George G. Kennedy, George H. Adams, Mrs. Lucian Newhall, Miss L. G. Peabody, Miss M. A. Tufts, A. H. Williams, and R. C. Larrabee.

It was voted that the Committee on the Preservation of Forests in New Hampshire, appointed by the Council, be continued as a Committee of the Club. The Committee consists of Messrs. C. E. Fay, J. R. Edmands, H. N. Shepard, and A. E. Scott.

The following vote was passed, on motion of Mr. Shepard: "The Council is authorized hereby to apply to the General Court at its present session for such an amendment to our Charter as may be required to empower the Club to hold and administer forest lands."

The reports of the Councillors of Explorations and Improvements were

presented, the latter giving in detail the large amount of work accomplished the past season in repairing camps and paths.

The Annual Reports of the Recording and Corresponding Secretaries, Treasurer, Trustees, and Auditors were presented. It was voted that the reports be accepted and placed on file.

The detailed report of the Excursion Committee was presented by the chairman, Mr. R. F. Curtis.

For the various reports see pp. 246 and 270.

According to the notice upon the call for the meeting, the following amendments to the By-Laws came up for action and were passed without opposition:—

To insert the following new article:—

“ART. XIX. The real estate belonging to the Club shall be under the control and direction of a Board of Trustees, consisting of the Councillor of Exploration for the time being, and four members of the Club, who shall be chosen by ballot at the first regular meeting following the adoption of this Article: one to serve until the next annual meeting, one until one year therefrom, one until two years therefrom, and one until three years therefrom; and, beginning with the next annual meeting, one shall be chosen to serve four years and until the election of his successor. The Trustees may elect from their own number a Chairman and a Treasurer, and may employ such assistance as they shall find necessary, provided the request therefor shall have been approved by the Council, and shall administer and manage said real estate, subject, however, to the general superintendence of the Council. In addition, the said Trustees, at each annual meeting of the Club, shall make a written statement relative to said real estate and the expenses upon the same and receipts therefrom for the preceding year.”

To amend by changing the Articles numbered XIX. and XX. to XX. and XXI.

An amendment providing for re-election of President and Vice-President was suggested by the Chairman of the Nominating Committee and informally discussed.

Mr. A. S. Parsons, Chairman of the Committee on the Nomination of Officers for 1894 presented the following list of candidates:—

For President, Philip S. Moxom; for Vice-President, John Herbert; for Recording Secretary, Rosewell B. Lawrence; for Corresponding Secretary, John Ritchie, Jr.; for Treasurer, John E. Alden; for Councillor of Natural History, William H. Niles; for Councillor of Topography, J. Rayner Edmands; for Councillor of Art, Lucy A. Putnam; for Councillor of Exploration, Arthur L. Goodrich; for Councillor of Improvements, Richard B. Grover; for Trustee of the Permanent Fund, Isaac Y. Chubbuck.

The balloting for officers resulted in the election of those nominated.

There were on exhibition at the meeting fifty-nine interesting photographs of scenery at Glacier Bay, Alaska, taken by Mr. Harry Fielding Reid, of Baltimore.

January 17, 1894. — Special Meeting.

In the absence of the President and Vice-President at the opening of the meeting Mr. Rest F. Curtis was elected chairman *pro tem*. Scarcely had the vote been announced when the newly elected President, Rev. Philip S. Moxom, appeared. To a pleasant introduction to the Club by Mr. Curtis, the President responded by appropriate remarks.

The lecture of the evening was "About Venezuela," by Mr. Wm. C. Bates. Introducing the subject with a map and a short historical account of the country, the lecturer proceeded to describe the people and their customs, the sea-coast towns, Caracas, and the mountain railway leading to it. The description of the natives who live on platforms over the water at Lake Maracaibo was particularly interesting. The lecture was illustrated with ninety stereopticon views.

One hundred and ten persons were present.

One Hundred and Forty-fourth Corporate Meeting.

President Moxom in the chair.

Eighty persons were present. According to the notice upon the call for the meeting, the amendments to the By-laws passed at the last regular meeting (q. v.) came up for final action. They were passed unanimously.

Miss Lucy A. Putnam presented a paper on a visit to the volcano Papandaya, Java. The luxuriant tropical vegetation of the island, the interesting people, and the terrible crater were described.

Mr. C. W. Willis, member of the Institute of Jamaica, presented a paper entitled "The Mountains of Jamaica." The speaker pointed out the situation of the island, described the climate, roads, and tropical vegetation, and treated at length of the mountains, sink-holes, and caverns. He also alluded to the government, cities, people, and habitations, and exhibited several interesting photographs of inhabitants and mountain scenery.

The Recording Secretary announced details concerning the winter excursion to Jackson, N. H., February 17.

Officers for 1894.*President.*

PHILIP S. MOXOM, 24 Thorndike St., Brookline.

Vice-President.

JOHN HERBERT, 19 Milk St., Boston.

Recording Secretary.

ROSEWELL B. LAWRENCE, 53 State St., Room 518, Boston.

Corresponding Secretary.

JOHN RITCHIE, JR., Box 2725, Boston.

Treasurer.

JOHN E. ALDEN, 18 Post Office Square.

Councillors.

Natural History, WILLIAM H. NILES, Mass. Inst. of Technology.

Topography, J. RAYNER EDMANDS, 63 Garden St., Cambridge.

Art, LUCY A. PUTNAM, 488 Beacon St., Boston.

Exploration, ARTHUR L. GOODRICH, 6 Linden St., Salem.

Improvements, RICHARD B. GROVER, 67 Ashland St., Roslindale.

Members added since June, 1893.**HONORARY MEMBERS.**

Dawson, George M., Ottawa, Ontario.	Keltie, J. Scott, London, England.
Heim, Albert, Zurich, Switzerland.	Richthofen, Ferdinand von, Berlin, Germany.
Hooker, Joseph Dalton, Sunningdale, Berkshire, England.	Russell, Israel C., Ann Arbor, Mich.

CORRESPONDING MEMBER.

Chapin, Frederick H., Hartford, Conn.

CORPORATE MEMBERS.

Adams, Mrs. George H., Boston.	Hazard, Miss Bertha, Roxbury.
Appleton, Miss Anne P., Roxbury.	Hidden, Miss Mary B., Cambridge.
Ayles, Miss Elizabeth, West Newton.	Hobart, Miss C. E., East Braintree.
Balch, Miss Emily G., Jamaica Plain.	Hough, Miss Elizabeth E., Brighton.
Blake, John Bapst, Boston.	Hubbard, Henry V., Taunton.
Blake, Mrs. John G., Boston.	HUNT, HUBBARD, ¹ Randolph, N. H.
Chaloner, Walter L., Boston.	James, George B., Roxbury.
Chase, Charles E., Lynn.	LOWE, CHARLES E., Randolph, N. H.
Church, Elliott B., Taunton.	Mead, Edwin D., Boston.
Darling, Charles R., Boston.	Noyes, Albert F., Auburndale.
Davis, Irving A., Chelsea.	Paine, Miss Jessie G., Charlestown.
Farnham, O. M., Roxbury.	Partridge, George F., Jamaica Plain.
Fitzpatrick, Miss Annie, Lynn.	Paul, Miss Fanny J., Charlestown.
Fox, Frank B., Cambridge.	Pettes, Miss Helen F., Brookline.
Fuller, T. O., Needham.	Sawyer, Harris E., Cambridge.
Fuller, Mrs. T. O., Needham.	Sise, Miss Gertrude W., Medford.
Grover, Thomas E., Canton.	Tufts, Leonard, Medford.
Grover, Mrs. Thomas E., Canton.	Whitney, Miss Anne, Boston.
Harmon, Miss Cornelia S., Lynn.	Williams, R. P., Boston.
Harmon, Rollin E., Lynn.	Woodward, Miss Lizzie J., Roxbury.
Haywood, Charles E., Boston.	Wright, Frank V., Salem.

¹ Life member.



MOUNT STEPHEN—CANADIAN ROCKIES.
From a photograph by E. O. Cockayne.

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Ascent of Mount Temple, Canadian Rockies.

BY SAMUEL E. S. ALLEN.

Read March 12, 1896.

THE main chain of the Canadian Rockies is separated from the Selkirks on the west by the broad valley of the Columbia, and drained on the east by the South Saskatchewan, of which the Bow River is one tributary. This whole chain, averaging in width about fifty miles, may be regarded as a complicated system of branch ranges, of which the main watershed forms the trunk. The latter, running generally from northwest to southeast, forms the actual crest of the Rocky Mountains and of the continent, as well as the provincial boundary between British Columbia on the west and Alberta on the east.

The Canadian Pacific Railway, after following the northeast bank of the Bow River for many miles, turns sharply westward from that stream just beyond Laggan station, some thirty-six miles west of Banff, and crosses this divide in one of its lowest portions, about six miles west of Laggan.

One who travels west from Banff up the valley of the Bow, will see in front of him, shortly after leaving Cascade Siding, a tall helmet-shaped peak rising in a series of inaccessible cliffs to a snow-tipped summit. But it is not until Laggan is reached, and the western face of the peak is seen, — now to the southeast, — that its height or beauty is adequately realized, although from all points it dominates the

landscape. From a base fifteen hundred feet higher than Laggan, this western face rises in one unbroken wall of nearly four thousand feet. A plateau above the latter is occupied by a magnificent area of glacier and *névé*, sweeping down in curving folds from the summit to the top of the wall, while the overhanging *séracs* above, and the fine powder on the scattered ledges below tell of many a thundering avalanche of ice. This is Mt. Temple.¹

My acquaintance with it began in August, 1891, when, returning from some climbing in the Selkirks, I saw it for the first time from the railroad. In 1893 I made a systematic attempt to ascend it, and of this climb I will venture to say a word before passing to the successful attempt of last August.

Having procured a small tent from Banff to complete my outfit, and being joined by an acquaintance, I was fortunate enough to obtain the services of one Enoch Wildman, an Assiniboine Indian from the Morley reservation, who, though possessing no local knowledge of this region, was of the greatest assistance in getting a pony through the thick forest. We followed the south bank of the Bow for about eight miles before turning southward to climb the foothills to timber line.

Following the open slopes until we looked down into the valley east of Mt. Temple, we camped by a small lake just eastward of the northern cliffs. After a day spent in examination of this side of the peak, we ascended by the eastern *arête* to a height of 9,800 feet, where we were

¹ Considering the uncertainty which many have felt concerning the two peaks, Mounts Temple and Lefroy, I am glad to be able to identify them, beyond a doubt, from a cut in Dr. Dawson's geological report. I need only say here that Mt. Temple, the ascent of which I here describe, was named by Dr. Dawson himself. The white cone upon the right side of that cut, which he calls Mt. Lefroy, is not the long white ridge at the head of Lake Louise, generally so called, but the bell-shaped, ice-capped peak a little to the left in the foreground, whose western *arête* is seen outlined against the long white ridge. It is the peak which many have known as Glacier Peak, — an erroneous name first applied through a misconception on the part of Mr. Astley, proprietor of the chalet at Lake Louise. Since Dr. Dawson's view is taken from a ridge northwest of Laggan, the summit of Mt. Lefroy, semicircular as seen from the north, naturally appears conical in the cut.



MOUNT TEMPLE AND BOW RIVER FROM LAGGAN.

From a photograph by S. E. S. Allen.

stopped by a steep precipice noted from below, but which I had hoped to turn by the southern flank. Bearing to the left with this object in view, we were soon upon a narrow sloping ledge of unstable rock, with the overhanging walls of Temple upon our right and a deep abyss upon our left. There was a steep gully in the cliffs, which in favorable weather might serve the purpose of ascent; but the wind was bitterly cold, the small stream had glazed the rocks with ice, and we encountered a storm of snow, all of which led to our return to camp and to Laggan.

In the summer of 1894, after several expeditions across various passes, a friend and I left the Louise Stream with two Indians and ponies for the Wastach River, as I have called it, — a stream flowing from the next valley to the east. Ascending this, we established a permanent camp on the eastern branch of the Wastach River.

The summit glacier of Mt. Temple occupies a plateau between the northern and western arêtes. From our permanent camp at the southwest foot of the peak no ice was visible. The mountain rose, — a gigantic pyramid of rock almost unrelieved by any snow from top to bottom. Like the other mountains of the region, the lower portions, some three thousand feet, were of gray quartzite; above this, reaching to the summit, some eighteen hundred feet farther up, was yellow or red limestone, the junction of the strata plainly seen around the whole south side of the mountain. The limestone above lay at an easy slope, but the quartzite offered little attraction. It was serried with many steep gullies and watercourses, and it was evident that, if the limestone slope was to be reached at all, it must be from the southeast side of the southern arête.

We were camped at the foot of a depression in the Temple branch of the watershed that connects Mt. Temple, its northern extremity, with the next peak to the south, which I have called the Sentinel. The col between, which I have known as Sentinel Pass, I crossed the following day.

As seen from camp, the lower slopes of this peak were of snow and ice, above which were steep slopes of broken rock, which formed the sky line. The southern arête of Mt.

Temple rose from the left, or north, of this col in a perpendicular cliff several hundred feet in height, with a second equally steep cliff above it, both seen in profile. From the top of the higher cliff, which marked the dividing line of quartzite and limestone, the arête ran with easy slope to the summit.¹

We ascended the slopes of snow and the short ice slope above, keeping over toward the left to gain the rock slope on the easiest side. The footing proved to be of an unstable kind,—with which I afterwards became well acquainted in this region,—fine powdery scree, packed full of slipping boulders of all sizes, no handholds nor good foothold, imminent danger of being crushed by the boulders from above;—such was this slope. At length, with a feeling of relief, we stepped upon the summit of Sentinel Pass. Descending upon the other side, I obtained my first view of the eastern face of the southern arête of Mt. Temple. I saw that from the top of Sentinel Pass it would certainly be possible to reach an elevation equal to the top of the lower cliff of that arête. The higher one was part of a hard stratification extending round the whole south side of the mountain, and undoubtedly formed the obstacle that defeated me in 1893. To ascend these cliffs was clearly no easy task; but I sketched a route which seemed to promise success, by one of the numerous gullies worn by the melting of a small snow-field above. Above the latter was the southern arête, its yellow limestone outlined against the blue sky.

I was for many days unable to try the route thus planned, being occupied in other ascents and expeditions. On Saturday, August 18, however, a party of three of us left camp to ascend Sentinel Pass. It was half past five, and the moon was still hovering over the rocky head of the great peak that shuts in the valley to the south, and which I have called Mt. Hungabee (the chieftain). The climb to Sentinel Pass

¹ The best plan to follow in the ascent of these mountains seems to be this: to endeavor to surmount the lower or quartzite stratifications from the southeast as nearly as possible to the southern arête; to cross the latter slightly above the union of quartzite and limestone, and continue up on the western side of the arête. The quartzite seems to be steep on the western side, and the limestone on the east.

caused us more trouble than before, the last three hundred feet requiring over an hour to ascend. The strain and fatigue of this portion was a poor beginning for an arduous day. Resting here for a time, we then surmounted the first series of cliffs without much difficulty, ascending by a wide gully, just below the arête, filled with ledges connected by piles of broken rock, fortunately less unstable than the slopes of Sentinel Pass. The chief difficulty with this portion of the mountain was the tendency to confusion on returning, as the mountain side is here set with a great number of buttresses or pillars, which from a distance all look alike, and effectually obscure the view from close at hand. It is of no assistance to pile up stones. Nature has done that with a lavish hand, and you would not recognize your own work on returning; besides, it would be a loss of hours.

Upon reaching the easy slope above, which, covered with fine scree, runs up to the base of the second series of cliffs, I found it impossible to recognize the gully which I had selected from below. They all seemed equally unattractive, and we skirted the base of these cliffs for a considerable distance, keeping always to the right, until we decided to try one better provided with small ledges than any we had seen. It led us to within about thirty feet of the top of the cliffs, where it was found necessary to leave it and try the rocks to the right, by which, after some pretty hard work, we gained the slope and snow-field above. One of my companions at this point, impressed by the easy appearance of this east side of the southern arête, suggested that we continue up the eastern side, and avoid an evident danger in crossing the arête above us; for the snow-field steepened just beneath the arête and became icy, and the cliffs below us were rather too close to allow any unnecessary risks. The suggestion was a good one, and I considered it for some time before casting the deciding vote to cross the arête, influenced by the practical certainty of the western side when once reached, and fearing (as it afterward appeared) that the eastern side might become too steep to allow us to get upon the arête at all.

Ascending the snow-field, we crossed the arête, marking

the spot to identify it on our return. The western side proved as excellent as had appeared from camp, and at twelve o'clock we stood upon the summit of Mt. Temple. The aneroid read 11,700 feet above the sea.

At a short distance below the summit the southern arête united with the eastern, and a beautiful cornice overhung the northeastern face. The steep gorges into which we looked on the eastern side were of great beauty, their yellow ledges contrasting strikingly with the dark shadows of the cliffs, and the patches of white snow in the hollows. After these two arêtes united they continued in a northwesterly direction until meeting the northern and western arêtes to form the summit. A large cornice rising and overhanging the northwest face hid our view of part of the Bow valley and of the superb summit glacier below us. The atmosphere was filled with blue haze from forest fires, and it was found impossible to do much more than photograph the summit itself. We built a cairn in a conspicuous place at the union of rock and snow, a little west of and below the summit, that the cornice might not hide it from Goat Mountain. It was afterward plainly seen with a glass from the latter peak, and even from the Saddle.

To describe adequately the view which on a perfectly clear day would be seen from the summit of Mt. Temple would be a task beyond my powers of description. The northern view over the Bow valley, and the low slate hills beyond it, is shut off by the rising cornice. From the east the eye sweeps over the ten sharp rock-peaks of the crest, separated from each other by slender precipitous couloirs of ice, which form the eastern boundary of the valley east of Mt. Temple, which I have called by its Assiniboine equivalent Wenkchemna, or the Valley of the Ten Peaks. The tenth peak to the south, Mt. Wenkchemna, connects Mt. Temple to the watershed by the links of Sentinel and Cathedral, over whose summits we look. West of these, below us, lies the broad valley which I have designated Wastach, or the Beautiful; its southern end bounded by the watershed, consisting here of the magnificent rock-peaks Mts. Hungabee and Ringrose, whose feet are encircled by a curving glacier, a crescent of sapphire



THE SUMMIT OF MOUNT TEMPLE.



IMPASSABLE CLIFF ON MOUNT TEMPLE.

From photographs by S. E. S. Allen.

blue, from either tip of which flow streams to form the Wastach River. Upon the eastern stream a speck of white on the green meadow is our camp, four thousand feet below us. Then, as the eye again returns to the watershed walls and to Mt. Ringrose, we see the western walls and summit glacier of Mt. Lefroy, joining to the watershed another branch parallel to ours, which forms the western boundary of Wastach valley, separating us from the valley of Lake Louise by the cliffs of the Mitre, Hazel Peak, and Goat Mountain.

Over the top of the latter we see Mts. Whyte and Pope and Piran east of Lake Louise, while far beyond the distant peaks and glaciers of the Waput-tehk group complete our panorama. After an hour spent upon the summit, we began to descend, crossing the arête at the point we had marked. By some mischance we missed the gorge by which we had ascended the cliffs, and had great difficulty in descending by a steep gully, which, by dint of lowering and assisting one another, we finally succeeded in passing. The rest of the descent to Sentinel Pass was made without difficulty. Instead of descending by the north side over the slipping rocks, we chose the southern slope, whose rocks, though steeper, were larger and more stable; besides, the snow extended farther up. It was more dangerous than the other side, however, as it was quite close to a rock fall on the Sentinel; and we hastened to reach the snow-fields, down which we glissaded, unroping at the bottom.

From the grass slopes I watched the sunset light upon the Sentinel. The gray peak rose above and behind steep slopes of shining ice, whence tall and slender columns, many hundred feet in height, touched with the fading colors, cast their purple shadows on the steel-gray ice below.

A Partial Ascent of Mount Stephen, Canadian Rockies.

BY CHARLES E. FAY.

ALTHOUGH, by reason of our failure to attain the summit, the climb here sketched can hardly claim a more important designation than a reconnaissance, it is perhaps worthy of record in APPALACHIA, on account of the great prominence of this impressive mountain, which, out of a vast multitude, forces itself upon the attention of all who traverse the Canadian Pacific Railway, and remains an enduring picture on their memory.

It rises, just beyond the Continental Divide and Hector Pass, directly from the railway tracks as they skirt the Wapta River at Field Station, where we had planned to tarry just twenty-four hours, especially for the purpose of studying Mt. Stephen. Inquiry of those best informed among the scanty population revealed great ignorance as to the possibilities of an ascent, though there seemed to be a tradition of two or three successful attempts. No one, however, believed it possible to accomplish it in much less than three days. Hence we set forth, on the morning after our arrival, with very moderate expectations, as the lateness of the hour of starting will bear witness.

It was 7.30 when we left the hotel. The day was August 18, — the very one, as it appears, that Mr. Allen and his party made the ascent of Mt. Temple described in the preceding article. As no one had told us of a path which leads to the fossil-beds nearly two miles up the lower slopes, we lost time in making our way along the west side of the torrent which here descends to the Wapta, issuing from a grand amphitheatre in the Mt. Stephen mass. The extreme steepness of the clayey bank, which we sidled along for a short distance, detained us considerably, so that it was a full hour before we had covered our first mile, to the point where we crossed to the other side of the stream, and bore away from it decidedly. Somewhere along here we crossed the path just alluded to; but it must have been very obscure, as it escaped our notice.

We must also have been below the end of a long kame-like ridge, with very steep sides, along the sharp crest of which the path runs, as we found on our return. Our way led through timber, some standing and some burned, parallel to this ridge and considerably to the east of it.

Before our second hour was past, we were making our way up a steep shaly slope to the point where the ridge abuts against the main spur of the mountain. We were traversing the fossil-beds, and nearly every fragment of the hundreds of pieces of shale that rattled beneath our steps contained at least one fossil and often two or three, principally trilobites. On one flat surface of about six square feet we counted fifty-six. The whole region, for a distance of a third of a mile at least, seemed a great graveyard, while the vast mountain itself appeared to be falling to decay.

Above the junction of the kame-like ridge with the main spur that we had chosen for our ascent, we bore to the left, and away from the torrent and its superb cascades (Skookum Falls), which lay just beyond and were filling the air with their rush and roar. It was our aim to reach by the most direct way a rounded knob at the lower end of the long sloping skyline, that seems to run with an easy, uniform gradient well up toward the summit. What lay between us and that knob was, considering the distance, the most toilsome bit of our day's work. The angle was perhaps 50° , the surface was made up of fine broken material offering wretched foothold, and nothing to cling to excepting the trees that here and there had contrived to strike root and maintain themselves, thereby winning our admiration. Making short "spurts" from one to another of these when possible, we at last reached the crest at the rounded shoulder, and here found ourselves travelling over the strangest sort of footing. This little summit was covered with what resembled a lawn, but in stone. From half an inch to an inch above the surface rose thin laminæ of shale, perhaps a millimetre in thickness, and from an eighth to a third of an inch apart, of varying lengths yet none of many inches, giving with their light and shade a general effect of dry grass, and breaking down under our footsteps.

It was now about 11 o'clock. We were already high above the floor of the great amphitheatre, and were looking down into it. Its farther wall was a mighty ridge inaccessible from the side towards us, with several summits, reaching eastward and then northward to join Mt. Stephen near its highest point. Two or three sudden pitch-offs along its crest showed that it could not be utilized in ascending the great peak.

From the point now attained the ascent became for the greater part a tedious upward pull for hours over shattered rock fragments at an average angle of about 35° . In a few places, owing to a change in the character of the strata, we had to vary this with actual clambering. Profound gorges on our left were flanked by shattered crags, and presented a most uninviting appearance. The whole surface we were traversing was in unstable equilibrium, so that when we stopped to lunch we were fain to build ourselves a basis somewhat more abiding. During this tarry, as indeed at all our halts, our view, owing to the dense smoke of forest fires, was almost wholly confined to the grandiose architecture of our own mountain. Even the mountains just across the narrow valley of the Wapta were veiled from us.

By 2.30 o'clock it began to look as if the summit might be reached after all. At Mr. Curtis's request I forged ahead, and by 2.45 found myself at the base of an escarpment¹ hardly more than 60 feet in height and probably not more than 350 feet below the highest peak. This rock face seemed so difficult to scale that I worked my way around its foot, and came to a point where, a week or ten days later, the steep might have been flanked, — a spot where even then, with rope and ice-axe, a party of three might have conquered the pass. The rock was here rent asunder, and a sloping surface led up between the two walls; but unfortunately this space was at its entrance completely occupied by granular ice, upon which a slip would have sent one rolling 3,000 feet below into the amphitheatre. This ice was rapidly yielding to the warm August sun, and a few days would doubtless have opened a passage.

¹ On the face of the vertical rock some four or five names had been painted, dating from the year that this section of the railroad was constructed.

Disappointed, I turned back to try the vertical rock at the point first reached. It seemed by no means impossible to scale the shattered face, and I tested it by clambering up, by such foot-holds and hand-holds as offered, for possibly 30 feet. Farther than this it seemed unwise to venture alone, and this became the limit of our journey.¹ As a memento of the spot, I brought away a fine amber-tinted quartz crystal, the only one in sight. Mr. Curtis had by this time come up, and his directions from beneath were useful in piloting me down from my perch.

It was now 8.15. We had been nearly eight hours in reaching this elevation, — fully 6,000 feet above the railroad; for the official survey accords Mt. Stephen 10,500 feet of altitude, and the station at Field is 4,050 feet above sea level. In view of the fact, however, that this day's work impressed me as the highest one day's climb I had ever made, I shall not be surprised if an error be discovered in this accepted altitude, and if the truth be found to lie somewhere between this determination and the doubtless exaggerated statement of the "Annotated Time Table" of the railway, which speaks of the "Duomo-like head of Mt. Stephen, 8,000 feet above the valley." Accepting the first-mentioned figures as correct, our average climbing was about 850 feet an hour, during the seven hours we may consider as having been devoted to actual climbing. I should have estimated it more liberally.

We had now four hours in which to retrace our way, if we were to get our train; and that we could not afford to miss, unless we were ready to give up a visit to Lake Louise, an alternative not to be entertained. Feeling it by no means certain that another hour, with its opportunity for investigation, would not put us upon the actual summit, we turned our backs upon Mt. Stephen for the time being.

In descending, we kept on the left (south) side of the spur up which we had come, and let ourselves down to the floor of the amphitheatre. Near by where the torrent leaves it is a spot that would offer a superb place to encamp for a party

¹ On the picture of Mt. Stephen (Plate xxvi.), this point is just above the intersection of the high band of snow with the right-hand slope.

proposing to give two days to an ascent of the peak. Leaving this wild alpine retreat, we followed near to the stream for a little way for a view of the mad cascades where the impetuous stream has channelled its way deep into the rock. For a mountain torrent, they are, though small, the most impressive for their irresistible fury of any that I have seen, and are of themselves well worthy of a visit from all who tarry at the cosey inn at Field. In passing, we would suggest to the management of the Canadian Pacific Railway, always so thoughtful of the æsthetic as well as the material interests of its patrons, that it would involve but a trifling outlay to put the path to the fossil-beds in good order, and to continue it to the falls and the amphitheatre. The Mt. Stephen House should be a leading resort for lovers of the beautiful.

Our return was facilitated by striking the path along the crest of the kame-like ridge; but lower down we lost it in the jungle, and came out the rest of the way following our own devices. It was 7.30 P.M., exactly twelve hours from our time of starting, when I reached the hotel. The east-bound train, which tarries here for the passengers to take supper, was already due, but not in sight. To our disgust, we learned that it was five hours late! Could we have had but one of those spare hours at our disposition in the mid-afternoon, perhaps the word "partial" might have been omitted from our title.

Mount Abbott,—An Introduction to the Selkirks.

BY REST F. CURTIS.

Read December 19, 1894.

TEN thousand miles is a rather interesting amount of ground to cover in a short summer vacation, and without the glamour of a trip to foreign lands; and so it certainly proved to two of us members of the Appalachian Mountain Club in the summer of 1894. When about two-thirds way through this distance, we found ourselves halting for some



VIEW NORTHWESTERLY FROM THE SUMMIT OF MOUNT ABBOTT.

From a photograph by William H. Rau, Philadelphia.

days in the heart of the Selkirks,—a region approaching as nearly as any on our continent to Switzerland in the characteristics of its mountain scenery. We had come there with one eye on the present and one on the future,—with hopes, perhaps soon to be realized, of bringing others to feast eye and soul on the imposing array of mountain peak and glacier, of forest and snow-field, which awaits those who can break a Canadian Pacific Railway journey at the Glacier House.

From such inspiring surroundings, with the bracing influences of clear mountain air, a sound night's sleep, and a well-served meal,—conditions which enhanced the pleasure of our whole stay at that hotel,—we started for our first day's climb. Mt. Abbott is not one of the higher mountains of the region; it does not call for climbing abilities of a high order, nor does it present the rugged and glacier-clad aspect of many of its neighbors; but it is absolutely adjacent to the base of operations, and its position, between the great Illicilliwaet and Asulkan glaciers on the one hand, and the valley of the Illicilliwaet River, as it rushes on to the Columbia, on the other, gives to the view which its crowning ridge affords a commanding sweep of many miles over eternal snows, with frequent excellent foregrounds.

The ascent naturally divides itself into three parts,—an excellent path through the woods up a shoulder of the mountain; a steep and rough pull over unstable rock-slides, slippery and tilted grass-slopes, and a rocky escarpment; and, finally, a long reach over gentler inclines and a sharp, slightly serrated ridge. Each of these sections occupied roughly an hour, and furnished its own peculiar quota of enjoyment, and together they well illustrated that interesting entity known as a "typical mountain climb," which has been analyzed and described by my companion, Professor Fay, in an early number of APPALACHIA.

The woods path has been clearly and even elaborately cut out by the authorities of the "C. P. R." It is broad, with excellent footing, and it saves the severe steepness of the general slope by frequent zig-zags, which, as they cross some transverse depressions, afford level and even downward stretches. The forest traversed is a noble one of large

spruce and fir, and its original wildness is typified in a veritable jungle of fallen trees, which made our path seem doubly dear.

The Rev. Mr. Green, in his volume on the Selkirks, ascribes to the undergrowth of this region a terror and an approach to impassability which members of our Club generally would hardly corroborate. We had been inured to hardships in some rough work among the tough manzanita wood and bristling whitethorn of Southern California a fortnight before; and yet a few scrambles which fell to our lot subsequently in the pathless woods of this vicinity enabled us to appreciate all that is true in Mr. Green's description.

The path ends at a charming circular sheet of water known as Marion Lake, nestled in between the shoulder we had just ascended and the more open slopes which were before us. The lake and the view from it of the surrounding mountains, though limited to not more than half a circumference by the mass of Mt. Abbott itself, is yet sufficiently fine to repay one well for the exertion necessary to reach it. The weakest of those who go on our Saturday outings could easily make it in half a day from the Glacier House, and have a couple of hours to enjoy the lake itself and views of the valley and distant snow-covered mountains through a charming fringe of evergreens which surround the water.

Up the steeper slopes with rude rockslides we now mounted cheerily, taking our bearings as openings offered, and plunging in through the woods, now growing thinner, and allowing the increasing grandeur of the higher view to break gradually upon us. The morning was fine, the air bracing; and I remember a feeling of zest and enthusiasm not usually experienced as we urged our way up, with some reasonably stiff pulls, to reach a small grassy plateau with a couple of diminutive but refreshing sheets of water, where we found ourselves for the first time facing snow that streaked the nearer flank of the main ridge. Here for the first time, too, we were greeted by loud whistles, at first suggesting human neighbors, but proving to come from a tame little animal somewhat larger than a gray squirrel, and not altogether unlike him,—the hoary marmot.

Taking a fresh start, we now found a tolerably easy passage over the summit escarpment, and came up on to the main ridge of the mountain at its northern end. It was here entirely open, the slopes much more gradual, and the rocks more smooth. We noticed one curious and unexplained feature,—a long stretch fifty feet or so in width, very much smoother than the rest, which we named “the Carriage-road,” and used as a landmark on our return. The ridge now narrowed down to a distinct crest on which we found ourselves taking a most exhilarating walk. On our right hand, and beginning close by, was a snow-field running down the flanks of the ridge, at first very steep, and then changing by most graceful curves to gentler slopes below. Our crest grew still narrower, till at times one might be on both sides at once, and some care was necessary to avoid a start down the slope. Sometimes the ridge would take a sudden rise which, when surmounted, would reveal still others to come, so that, indeed, it was difficult to say which was the actual summit. After nearly an hour of this delightful crest walk, taken in very leisurely fashion, we reached its southern end, stretched ourselves out on a small flat rock to moisten our lips from a pool, partake of our not unwelcome luncheon, and take in the view.

And a superb view it certainly was. To the north, after passing the nearer snow, the eye rested on the pleasing green slopes of the lower stretches of our own mountain, with the Illicilliwaet at the bottom of the valley, and the noble mass of the Hermit Range rising beyond with a clear serrated skyline. Down the sides of this range, as well as the nearer ones, ran several glacier streams. These are equally enjoyable through the eye and the ear; and I cannot speak too strongly of the delight which their delicate rippling music brings, as one sits utterly still and takes it in from a distance. One cannot get away from it if he would, and he surely would not if he could. Farther around to the east, the successive peaks of Avalanche, Eagle Peak, its misnomer “double,” and the crowning Sir Donald met our eye, and we took suggestive looks for the morrow. Then came the vast snow-fields and névé out of which the Illicilliwaet and Asulkan glaciers spring, and the upper parts of the glaciers

themselves, and then the majestic peaks of Donkin, Dawson, and Bonney, mostly snow-clad, and beautiful Mt. Purity entirely so. The dazzling beauty of the scene, so largely white, was relieved by the forests below and the rock-summits projecting above, and we could have stayed hours if they had been to spare. The scene is not to be compared with any of our Appalachian Mountain views at all, but it did recall a day spent on the Wengern-Alp near Grindelwald; and I do not exaggerate my impressions of the views of this region when I say that they will bear comparison well, day by day, with those of a short Swiss trip which I had the pleasure of taking a few years ago with Professor Allen of our Club.

We had completed Mt. Abbott, at least upwards; but the far-reaching spirit of my companion had led him to look with longing eyes on a nameless peak still farther on, and rising a few hundred feet higher, up which, on the side towards us, a steep snow-field swept nearly to the summit. As time seemed likely to allow, he started down to the intervening col and towards his goal, with an understanding that we should meet on the snow-field below the peak if we did not both reach the summit. I never have been able to find that there was anything especially interesting in the view from that peak, for the accounts I heard of it were most meagre. He conquered it, however, while I was fain to content myself with a climb on the lower slopes and a stay at a delicious pool at the base. Then I went around on the snow toward the side where he was to descend. Soon I saw him coming down the rocks to the edge of the snow, and then preparing to start off to meet me, as he had threatened to do, by a long slide on the snow, technically known as a "glissade." We both grew accustomed to this mode of travelling later on; but this was a day of first experiences, and here was one. I watched him hover for a few moments on the brink, and then away he shot downward on a slope much too steep for standing. I believe the formal alpine glissade is made upright, on a tripod composed of one's two legs, and the alpenstock held firmly under the arm and striking the snow behind; but this was made in a sitting posture, with a decided cant of the body to the rear, with a somewhat tripodic appearance occasioned by the two arms

bracing behind, accompanied by a fierce gleam from, or rather through, a pair of spectacles, a bisection of a big set of whiskers, a fountain of snow from boots leading the way, and a furrow trailing behind, plainly visible at every backward look long after we had started on our homeward way. A rising ridge of the snow cut off this vision from me before a halt was cried; but I rushed on and over, and found the athlete in an unhurt and altogether triumphant condition, several hundred feet below his starting-point. I should add that on the hard-packed snow, with no crevasses, this sort of fun, though looking a little risky to the novice, is really not attended with danger.

We paralleled the length of our crest of the morning on the snow-field beneath, then crossed the ridge, and, returning by substantially the same route, reached Marion Lake shortly before sunset. At its bank I found my partner, who had been slightly ahead, just ready for a plunge into the chilly water, and, nothing loath, I followed suit. It was a refreshing close to our trip; and a smart run down the path brought us to a late supper and a welcome bed at the Glacier House.

Our Bivouac on Eagle Peak, Selkirks.

BY CHARLES E. FAY.

Read December 19, 1894.

"If on any night we fail to appear, wait a full day before sending out a rescuing-party," was among the first of our remarks to Mr. Perley, the genial landlord of the Glacier House, on our arrival last August at that delightful spot. It was half jest, half earnest. We had no definite expectation of undertaking what might compel a bivouac; neither had we had any two weeks before, when our failure to come in from a trip into the unknown on Mt. San Bernardino in Southern California,—owing to the temporary indisposition of my companion,—had resulted in an exhibition of loyalty on the part of new-made friends, flattering to us and to

human nature in general, but quite uncalled for. Accordingly, thus early in our brief stay in the Selkirks, we set forth our theory, that night is a perfectly normal part of the twenty-four-hour day, differing from the portion ordinarily devoted to climbing principally in its meagre opportunity for secure and speedy progress; but that quiescence does not necessarily imply danger, possibly not even discomfort. And our host of the Glacier House listened and made a note of it.

The evening after our return from the trip to Mt. Abbott — described by my companion, Mr. Curtis, in another article in this issue of APPALACHIA — was spent in reading and discussing those pages of the Swiss Alpine Club's *Jahrbuch*¹ in which Mr. Huber describes his ascent of Mt. Sir Donald. We had set apart the morrow for a ramble in the direction of that superb peak, unclimbed since its conquest in 1890. As, in the light of our reading, our plan assumed more definite shape, we concluded to follow in the footsteps of the Swiss explorers as far, possibly, as to where they found their only serious difficulty. We contemplated no emulation of their bold feat; and yet — well, I think a dash and a pause long enough to count two will express our hope as definitely as we at any time formulated it. Before retiring for the night, we left word at the office that we should start early the next morning in the direction of Sir Donald, but should probably turn to the left and skirt along the base of the main crest towards Eagle Peak, and, as we hoped, return over the peak itself.

We arose about 5 o'clock. The more subdued rush of the glacial torrents was the only sound in the air of this lofty fir-draped valley, — a sound so incessant as almost to class with the permanent objects of vision. If anything, it heightens by contrast the general hush that otherwise wraps the morning scene, continuing restful night even after the tardy sunrise in this nook where man does not bestir himself until long after his fellows in the work-a-day world have taken up the routine of their existence. Nothing was astir as we made our preparations to be off, and we had

¹ *Jahrbuch des Schweizer Alpenclub*, vol. xxvi.

nearly despatched a meal at our rooms, drawn from our own supplies, before it was discovered that the Chinese cook and his assistant had noiselessly appeared in the kitchen to begin preparations for the earliest (half past seven) breakfast of the hotel. Sworn enemies of the unusual, it required no little persuasion to secure from them two glasses of milk to carry to the scene of our dry breakfast; but outwearied indulgence could have found no more indignant expression than that upon the face of the head cook, when, returning with the empty glasses, I called his celestial attention to the fact that as one of these was smaller than the other, I should consider it an act of poetic justice if he would grant additional lacteal favor. His scornful look needed no accompaniment from his limited store of speech, but the stern words "Stop now!" set the double seal of hopelessness upon further effort.

At 6.30 we set forth in light marching order. A rubber pouch contained what provision in the way of canned meat, pilot-bread, prunes, and chocolate was most ample for the longest day's exploration. Overcoats were left behind; but I carried my "sweater," a garment beyond praise for the mountaineer. With anticipations heightened by the joys of the day before, we sped cheerily up the path towards the glacier, and near its foot entered the branch which for some half a mile continues along the northern moraine, — the same that I had followed in my solitary ramble up to the crags of Sir Donald in 1890. Little did I then expect ever to traverse it again. Judging by its blindness in places, and particularly by the way in which it is overgrown with alders, few have used it since. The route we followed was almost step for step the one taken on that occasion, but now cheered by companionship. It being some three weeks earlier in the season, the air was less autumnal; no ice coated the stones of the streams, but the expanses of unmelted snow on the higher slopes were more numerous and larger. It proved that two travel more leisurely than one, so that an hour's lead in time was cancelled before we reached the base of the great dark rock, my ten o'clock point in 1890.

From here it was new ground for us both. Our way led to the right, and our first business was to reach the point of junction of the crags with a great moraine, along whose western base we had for some time been skirting. It was formed by the lofty glacier which fills the great depression between the steep face of Sir Donald and the ridge which, sweeping southwesterly from the sharp peak ascended by Mr. Green in his reconnaissance of Sir Donald in 1888, ends below Perley Rock. The stiff climb up to the crest was easier than it would have been had we not taken advantage of a long strip of snow that filled the angle between moraine and ledge. Up this we zigzagged, the snow being just soft enough to make it easy to stamp footsteps. Attaining the ridge, the glacier was before us, and we beheld a situation far more unpromising than our reconnaissance on Mt. Abbott had prepared us to expect. We had hoped that either a feasible way would be found along the rocks parallel with the ice, or that the ice itself would prove not too dangerous for a party of two. Our first glance dissipated all hope of either. The badly crevassed surface of a much more extensive glacier than we had anticipated finding, bade us desist from further investigations in this direction, and turn our attention to our alternate plan. We did find it possible to make our way for a few hundred feet along the edge of the ice to a point where a grassy gully led up directly towards the base of the great obelisk of Sir Donald, and ere long we were upon the broad slope that sweeps downward from it at an angle of perhaps 40°, and shortly had reached the intersection with my former course, not far from its upper limit.

The desire to revisit the highest point then attained, and particularly to examine more nearly a place which Mr. Huber had suggested might offer a possible access to the summit, led me to part from my companion for a brief détour to the very base of the precipitous cliff. The upper part of the way was upon snow, which, while it furnished good footing, was nevertheless so steep as to make a single climber feel a little unsteady, even where a fall meant only a hurried descent of a few hundred feet, with possibly a few

bruises at the lower end. Hence I did not go entirely up to the crevice in question; but careful scrutiny from the point attained revealed nothing promising beyond a very short distance. It is probable that Sir Donald is wholly inaccessible on its southerly side at any point other than that chosen by the Swiss climbers.

Returning to my companion, we took up our journey westward. Our course was in general a contour, but with one or two sudden descents and corresponding regainings of lost ground. Some of the time we were upon broken rock, but more frequently sidling slowly across steep-lying snows, or else making good time upon hard *névé* at more favorable angles. Thus we passed under the towering crags of the summit which Huber mistakenly calls "Eagle Peak,"¹ climbed by his party two days before their ascent of Sir Donald, and we doubtless crossed their trail on the red-rock ridge that connects the low peak on our left and now below us — the one I had started to climb in 1890 — with the principal crest reaching westward from Sir Donald.

Leaving this behind us, grateful to it for a little water trickling down its ragged side, we made a short glissade down to the large snow-field that fills the basin between it and the true Eagle Peak, that was now towering perhaps 1800 feet above us, — a somewhat formidable pyramid of rock. The side towards us, at its base at least, was wholly inaccessible. A couloir led up on the right to where it joined the main ridge. If we had meditated trying this approach, we should certainly have given it up; for just then a most villanous avalanche of stones, large and small, came tearing down as if possessed with a swinish demon apiece. We therefore bore to the left, towards where the southern *arête* descended to the snow-field, there took to the rocks, passed around the *arête*, and soon we were making our way upward on its western side. We were forced onto the rocks again earlier than we should have been, had not

¹ I venture to suggest "Uto Peak" as a name for this summit, which from its prominence in the group is in great need of a distinctive title. It is somewhat higher than Eagle Peak, and nearer to Sir Donald. — "Uto" is the name of the Zurich section of the Swiss Alpine Club, that of which Mr. Huber is a member.

the snow which here runs quite high up on the southern slope of the big pyramid been found arduous climbing.¹

How far our route would be found feasible was uncertain; but accepting such opportunities as offered themselves, we kept on, and very soon found ourselves forced out to the very edge of the arête, where it looked as if our progress was to receive a check. But a shelf, perhaps two feet wide, under a jutting rock seemed to offer a passage, if there was anything on the other side to which to pass. It was a great satisfaction, on peering around the corner, to see that, while not over-inviting, a tilted surface of rock would permit a safe transit, with better chances beyond. We were now well above the first steep cliffs that we had seen rising from the snow-field shortly before; but this whole easterly side is so precipitous that in very few places (and above where we were, in none) can it be traversed at all.

A series of rapidly ascending narrow ledges assisted us to a point several hundred feet higher, in one or two places demanding caution. At length, when we were perhaps within five hundred feet of the summit, the attempt to scale a steeper bit than any yet found resulted in a failure; and the backward slip, while not perilous, was enough to dampen ardor. Right at this point, however, there was apparently an opportunity to pass again to the westerly side of the arête, where perhaps easy climbing would await us. Just to our left there was a smooth expanse of rock, some twelve feet square, inclined at a small angle of, say, 20°,—the largest and nearest level surface of rock, I think, on that face of the peak. Just above and beyond it, it was easy to cross to the other side of the arête. "So near and yet so far!" To reach it required a "traverse" around a buttress of rock offering good footholds, but bulging outward at about the level where the passer-by's body requires most room; in fact, quite lacking the sweet conformity of the eastern to the western continent on a map of the world. To make matters worse, the handholds were very deficient. It seemed not too dangerous, although a fall meant a preliminary drop of per-

¹ I have recently learned that Mr. S. E. S. Allen reached the summit in 1893 by keeping up this face to a very much higher point.



THE SUMMIT OF EAGLE PEAK FROM COL ON THE EAST.

From a photograph by Emil Huber, S. A. C.

haps thirty feet, with chances favorable for a second one of many hundred to the snow-field below. The litter member went first, and by crouching passed under the projecting mass, and was soon on solid footing, whence he was able to lend material aid in maintaining the centre of gravity of his stouter companion. Pausing long enough to get breath and a sip of water from a pool in the rock, — the first water we had found upon the peak, — we climbed quickly to the edge, and here made two important discoveries: first, that an advance was no more practicable than on the east side, and again that the sun was ominously near to the western horizon. The day had sped like magic; what had seemed quarters had been full hours.

Two plans were feasible, and two only: to spend the night there, or to retrace our steps to lower levels. A vote resulted in a tie, my companion being of opinion that possibly we had had fun enough for one day, especially within the last fifteen minutes. Then again here was water and a smooth place to lie down. On the other hand, it was urged that 8500 feet up a mountain in the Selkirks might prove pretty cold for persons equipped with no more wraps than we had brought, that we apparently had to go down sometime, and, as we were not really tired, we might as well begin. Again, as it was the night before full moon, it was quite likely that we might make timber, and have use for our supply of matches, which here were absurdly out of function. Counting in a majority of the absent sages in mountaineering, whom he felt sure would agree with him, the leader declared his side prevailing, and we got under way. I shall pass over in silence, as indeed *we* then did, comparatively, the more serious return over the difficult place recently passed, as we had fondly hoped once for all. For the lighter man it was easier than the first time; for him of more obtrusive façade correspondingly harder. At length, both safely landed, we began our descent; but faster than ourselves was the oncoming of the dusk, in which, however, we made some of our delicate passages the more speedily and with greater sense of security than we had done in fuller daylight. Soon, however, it proved to be a losing race; and

when darkness was making farther advance dangerous, we yielded gracefully to the inevitable.

It would be incorrect to say that we looked around for a place to make ourselves comfortable. There was n't any "around." On one side vertical rock; on the other nothing worth mentioning this side of a pale snow-field, dominated by the gigantic wedge of Sir Donald only a mile away. Behind us, nothing we cared to know more about, at least this side of the top of the peak; before us, a hope with Night's extinguisher let down upon it. But the place where we then were was altogether too dull, with not even a chance to sit down; and who wants to stand up all night, even with a chance to lean against a pyramid that pygmies the original Cheops? Cautiously letting ourselves down a few rods, we found exactly our pattern. The shelf widened to seven feet, and transversely across it ran a crevice two feet wide and about the same in depth, making an obtuse angle at its inner end. Its bottom was quite flat and free of troublesome projections. It was just the place to wedge in a thick man and a thin one so firmly that Eagle Peak could not shake off his intruders, even if he summoned a robust earthquake or two to his assistance.

That should be our bedroom; but now it was only supper-time. Some of that water in the cool upper chamber would have been welcome to wash down our adequate though to me undesired meal. One or two prunes and as much canned ham as would cover the point of a jack-knife sufficed. I was more curious to know how I was to keep warm with only my "sweater," when two thick blankets had not been burdensome the night before at the Glacier House, now more than three thousand feet below us. Less dubious was my companion's state, with his more generous encasement of adipose. But now see what warm friends long companionship in our Club can make! Mr. Curtis, as the chill grew a little more marked, shared with me, not his last crust, but his bodily temperature to the last degree. Sitting down with my back against the cliff, he sat down before me, and my arms about his shoulders held him in a fast embrace. And so we sat until the moon came up past the edge of Sir

Donald, ushering in a scene of enchantment beautiful enough to drive away every thought of physical discomfort.

To describe the fascinations of that superb night would require a master hand. I can only schedule a few of its principal features. To the south and east, as far as the eye could reach, vast expanses of glacier and snow-field, out of which towered the mildly gleaming phantom forms of Donkin, Dawson, Fox, Purity, and other nameless peaks. In the middle ground the great Illicilliwaet Glacier,—no longer a tremendous cascade of ice, but a broad river, we were so high above it. To its left that great ridge which culminates in the pointed peak ascended by Green; and hanging high up on its hither side in the shadow, a lofty glacier from which, more than once, unseen masses breaking off fell with a crash to depths below,—this and the rush of waters the sole sounds to break the moonlit silence. Finally, soaring high above the dark crags of “Uto” and the connecting ridge, the great obelisk itself, most like the Matterhorn from our position, all night long reflecting the moonbeams from new faces, as the low-riding orb passed over and beyond the meridian. Then the planets in turn, — Mars, Jupiter, Venus, — wonderfully bright, just as when we noted their welcome coming two weeks before in our watch high up on San Bernardino. The pole star here was eighteen degrees nearer the zenith.

How great a contrast between those two bivouacs at almost exactly the same altitude! Here upon the vertical side of a granitic pyramid; there in the trough of a great rock-strewn gorge hardly noticeable among the many that seam the mass of a ponderous dome that springs 9000 feet above its foundations. Here a wilderness of ice and snow and the sound of many waters; there all Nature parched and arid, striving to dream that ever snow had fallen where now no trace of humidity appeared save in the lower cañons a vertical mile below. Here no sign of human agency, no more than if we alone were occupants of an abandoned Earth, hundreds of miles as we faced to the nearest homes of men; there in glittering patches the electric lights of new and enterprising cities, — Riverside, San Bernardino,

Redlands, — quivering as if with the pulses of their ardent life. Here the cold moonlight; there the flare and roar of our camp-fire, an enormous log¹ of sugar-pine ablaze from end to end, with sudden bursts of mad flame and fierce hissing as the fire would catch in the manzanita and reduce square rods of it to charred ruin.

I will not deny that we missed that camp-fire, but night for night this was by far the more comfortable. Considering the latitude, altitude, and season, it must have been unusually warm. I doubt if the temperature fell below 55°, and there was but little wind. Though we had no water, we at least had recently quenched our thirst. On San Bernardino, when we halted for the night, we had tasted none for thirteen hours, and during those hours we had been climbing six thousand feet in a bone-dry air at a temperature of nearly 100°. We had to wait ten hours longer, and descend five thousand feet before we found any. Thirst was the sole drawback of that otherwise enviable night. The one passed on Eagle Peak is a memory unblemished and beyond price.

It passed quickly, being only about eight hours from dusk to dawn. My companion slept a fair per cent of the time; I perhaps an hour in various naps. The pallor of daybreak began about three o'clock; at quarter to four it was light enough to reconnoitre.

First a careful glance was given to the edge of the arête within a few yards of where we had halted. The very edge seemed feasible, but between us and it lay an apparently untraversable steep. Surely no human feet ever came that way. Our descent of the evening before I then retraced for some distance, with a careful study of the rocks on the left, to be sure that we had not passed in the twilight the place at which we had first come to this side of the arête. Returning to Mr. Curtis, we enjoyed together the grand spectacle of an alpine sunrise, with its exquisite tints of rose on peak and firn, then an informal breakfast, and we were off.

Of course, if not here nor above us, our way must be below.

¹ Its perfect dryness and pitchiness will be understood, when I say that although fully three feet in diameter, it was entirely consumed during this single night.

A feasible descensus was found, though more than once it became necessary for the man of longer leg-reach, who had gained some good position, to proffer his shoulders to the feet of his companion, and, converting himself into a toggle joint, lower him to a good foothold. Thus we descended perhaps two hundred feet, and stopped for good cause,—we were at the top of the vertical cliffs above the snow-field, and there was no passing beyond. So then the desired passage was after all at some point above our bivouac. With critical observation we retraced our steps, our “rope” aiding at the difficult places found in our descent, and soon were again passing our bivouac. A glance confirmed the belief that that was not our place of crossing the arête, and we began to retrace the steps of the day before; and so completely did we do this that in due time we had attained our highest point on Eagle Peak, yet no side lead, missed in the dusk, rewarded our search.

Again we descended, and again we were at the familiar spot where we passed the night; but it was now 10 A. M. Six hours had been busily spent to prove that the point we sought was neither above us nor below us nor here; and yet it was somewhere. This was a fact exceedingly comforting. Here we surely were; we were not created here; we got here; then somehow and by some way. It really became necessary to formulate this logic. We catechised each other. “Are you absolutely sure the place is not below us?” “Absolutely.” “Would you swear in court that it is not above us?” “Yes, and if your precious life depended on it.” “Will you base your hopes of future dinners and warm beds on the postulate that it is not right here?” “Look for yourself. Do you think any two-footed thing ever came over that rock-face?” “It does n’t look reasonable; but every other point looks even less so. Suppose I go and try it.” “No, please. I am doing the simian business for this party.” Drawing cautiously nearer, with attention diverted from the disturbing precipice, the surface of rock looking so steep in the flatness of full sunlight proved feasible, the edge was attained, and at once we came upon traces of our passage of the days before, and were out of duress.

Of course it is easy to say that we ought to have placed a cairn at this point as we came up. True; but as it was obviously the only possible trail, it did not seem necessary; besides, we had no real belief that we should come back this way, though the possibility of so doing should have led us to study the place after passing, so as to carry away a mental picture of it from that other side. It was an expensive oversight, so far as time was concerned.

Our way home was by the high valley out of which flows the stream which enters the Illicilliwaet opposite the great slide that one passes on the path to the glacier. We descended rapidly over broken rock, hard snow, steep slopes of alpine grass, to the little pool in which the glacial water tarries before it plunges steeply down through the timber. On the left, as one descends, rises a huge perpendicular wall sometimes twelve to fifteen hundred feet in height. It is the west face of the low rocky peak already alluded to. As we passed along under it, we heard a shout. Looking up, we saw three diminutive figures dancing a war-dance against the sky. They might have been brownies, but they dropped full-sized human voices down to our level. The first words we could make out were, "Are you hungry?" We answered honestly, "No." They made motions as if to throw something down to us. We made signs of deprecation, and they desisted. "Wait for us lower down." We met at the pools, and there learned that, while Mr. Perley had kept perfectly cool, relying on our ability to look out for ourselves and mindful of the request made on our arrival, a panic had seized some of the guests and two parties had been sent out to look for us. The other was over towards Sir Donald. Had we stayed on the side of Eagle Peak a little longer, we should have had the pleasure of seeing them, and perhaps of directing their labors. They came upon our trail pointing away from the great peak, and returned to the Glacier House, arriving some hours after Mr. Curtis and myself, who came in in the best of order over the Cascade path at half past two, happily not too late for the excellent dinner of the hotel, to which we did ample justice.

A Visit to Darjeeling.

BY LUCY ABBOTT PUTNAM.

Read October 17, 1894.

ONE of the interesting features of a voyage to India is the talk of one's fellow-passengers, — the army officers and civil-service men on their way back to their posts after "long leave" in England. On an outward-bound "P. and O." at any time during October, one is sure to find people from stations in every well-known district in the empire; and their casual remarks make the places of one's dreams — Delhi, Agra and the Taj, Fattahpore Sikri, the Mogul residence, Lucknow, Cawnpore, and the holy city of Benares — seem very near and real.

But to the average Anglo-Indian there is one place that surpasses all others, not so much for its beauty as for its climate, — which is not surprising, considering how long some of them have been "grilling on the plains," to use their own expression.

"Of course you are going to Darjeeling to see the snows?" is the question that is most frequently asked between London and Bombay; and of course we were going.

We took the night train from Benares, which reaches Calcutta, as most Indian trains do reach their destination, at the dark and unholy hour of five in the morning. It was Christmas week, and every one who could get away had come down from the up-country stations for the races. The boarding-houses, the pleasantest places at which to stay in Calcutta, had been full for weeks. That huge caravansary, the Great Eastern, was overflowing, and at "Spence's," to which we had written for rooms, the best that they could do for four people was one little box at the top of the house. There was nothing for it but to go on to Darjeeling that night.

It is twenty-four hours from Calcutta to Darjeeling, which lies near the southern border of Sikkim, and is one of the two great health-resorts for the English in India; Simla, eight hundred miles to the west, being the other.

It was very hot, I remember, as we drove through the fort that morning and along the Maidan, and it was hotter still in the afternoon when we drove to the station, so that it hardly seemed possible that we could need all the wraps and rugs that we were taking. But we knew by experience that at that season nights in an Indian railway-carriage are chilly, even on the plains, and we were bound northward. It was dark when we reached Damukdiya on the Ganges, though the glow of a red Indian sunset lingered in the west. A big flat-bottomed steamer took us across the river to Sara Ghat, to connect with the train for Siliguri.

It is one of the advantages of Indian travel that four first-class tickets will always secure you a private carriage, roomy and comfortable; a through carriage, too, that is switched off at the junctions, so that you can sleep peacefully through the changes instead of having to turn out on to the platform at one o'clock in the morning, like the unfortunates who are travelling alone or with only one or two companions. Early the next morning we all had to change, however, for at Siliguri the broad gauge ceases, and a little toy train was waiting to take us up into the hills. The railroad follows the general direction of the old road to Darjeeling, with loops and switch-backs, so that we often crossed the road, made a long detour, and found ourselves at the road again, with the boys who had begged of us fifty feet below waiting for more backsheesh. At Kersong, the half-way station, we crossed, if I remember rightly, a narrow saddle, and then began ascending the other side of the range, on which Darjeeling stands.

The views everywhere were magnificent, though there was no sun and clouds hid the distant peaks. The foliage, too, is wonderfully fine and varied. At Siliguri, which is damp and malarious, were rank jungle grass and bamboo; but as we ascended, the nhim and peeples trees of the plains gave place to gigantic oaks, chestnuts, and walnuts, mingled with palms. Great vines and creepers ran from tree to tree, and in the crotches of the branches were ferns and orchids. Higher up were magnolias and tree ferns. The latter were beautiful, but not nearly so large and fine as those that we

saw later in Java. The begonias were not in blossom, but we saw rhododendrons and quantities of *Andromeda*, and the air was often heavy with the fragrance of *Daphne*.

It was cloudy, as I have said, when we reached Darjeeling, and it was cloudy again the next day, and it looked and felt as if it were going to snow. It was Sunday and New Year's Day, and what was to us rather more to the point just then, it was market-day; for Darjeeling is the centre for a large country, and the market alone is worth the journey from Calcutta. The town was crowded with all sorts of queer people with pig-tails, — Lepchas, who form the greater part of the population of Sikkim; Bhutias, from the neighboring state of Bhutan; Nepaulese, Thibetans from across the mountains; tall, red-capped Parsee merchants; Hindu servants in graceful turbans and draperies; and a few Europeans, tourists like ourselves. Around the square were spread sheets of native cotton; and on these sat the women, surrounded by their wares. There were heavy native garments and Manchester cottons, all sorts of grains, dried meat and fish, heaps of what looked like chips and shavings, but was apparently edible, queer condiments of various kinds, and a great variety of candies. In one corner were the money-changers, squatting among little piles of the small silver coin of the different native states. We changed a rupee for some of the most curious of these, to the woman's great delight and amusement; so I have no doubt that we were well cheated. The women were all jolly little creatures, with a most contagious laugh; and apparently they found us quite as funny as we found them. They are short and squat, with broad flat faces, which they paint with dark red, in a manner resembling freckles, across the nose and upper part of the cheek. Most of them had strings of silver coins round their necks, and were evidently the family savings-banks.

As we were leaving the square, we met a picturesque group of men with packs of furs on their backs, which they had brought across the great pass from Thibet on the other side of the Himalayas. They were eager to show us what they had, but we did not want to be tempted, and fled. When

we got back to the hotel, we found that temptation in another form was waiting for us. A tall Cashmiri had opened a bazaar on the veranda. There were royal tiger skins from the jungles, silver fox and wolf skins from Afghanistan, hammered brass and brocades from Benares, Rampore chud-ders, silverware from Kutch and Burmah, Decca muslins, and Bokhara embroideries, which were masses of bright colors, with here and there a few black stitches to keep away the evil spirits. There was something to tempt every one; and yet, as if these were not sufficient, just outside the gate sat a man with a collection of curiosities, such as could hardly be bought except in the Himalayas. There were oddly shaped knives and swords, tom-toms made of human skulls, praying-machines like large rattles with the prayers on strips of paper inside, charms against evil spirits, and little bells from some shrine or temple in Thibet. There was one bell, for which he asked a most unconscionable number of rupees. I wanted that bell, and he knew it, and rang it every time we came in sight; and I cannot now think of Darjeeling without hearing the tinkle of the bell, and seeing the grin on that dark Tartar face.

That night was wild and stormy. A lonely homesick wind whistled through the cracks, and the jackals howled in the market-place. As I lay awake and listened to them, I wondered how long we should have to wait before we had our first view of the snows.

It was at a very early hour the next morning that I was aroused by a sharp rap on the door, "Why are n't you up? Look out and see the mountains!"

More than half asleep, I groped about, found some wraps, and stepped out on the balcony, where a chorus of exclamations from neighboring balconies greeted my ears. It was dark, but clear and frosty, and there was a strange faint glow in the air. Far below us lay the valley, so deep and dark that we could not see the bottom; and beyond rose range after range of black hills, grand enough to have satisfied any one, and yet they were not enough.

"Where are the mountains?" I said. "I don't see them!"



THE HIMALAYA RANGE FROM DARJEELING.

From a photograph by Brorne and Shepherd, Calcutta.

"Why, there!" every one cried. "You are not looking high enough."

And that was it. Away up in the sky, as high, it seemed to me at that moment, as one ordinarily with us looks for the North Star, was the great crest of Kinchinjanga, the flat summit of Kabru, and Jannu like a rosy finger, all glowing and sparkling in the warm sunlight. Darjeeling is over seven thousand feet high, and as the crow flies it is quite forty-five miles to Kinchinjanga, and yet one has to look up. Soon after we left Darjeeling I wrote to a friend in the Club that it was no more possible to imagine the Himalayas from having seen the Alps, than it was possible to imagine the view from the Gorner Grat from having seen the Blue Hills. It sounds like exaggeration, but it did not seem so to me at the time. It is with something very like fear, too, that one gazes for the first time on those mighty peaks. They cannot be, you think, on the sphere upon which you stand. Some other world must have broken loose and is crossing the path of our earth. You wait breathless for the awful crash when the two meet, and it is a surprise when it does not come. I queried as I dressed that morning whether the mountains would seem so wonderful after breakfast; but though in the days to come we saw them under every aspect, — in the early morning, in the glare of noontide, and in the light of a sun that had set for us, standing proudly out against a clear blue background, showing for a moment through rifts in drifting clouds, or rising majestic above level stratus bands, — the impression made is always the same. The Matterhorn is, and I think always will be, my ideal mountain; but even that marvellous peak does not fill one with the same awe as Kinchinjanga. Perhaps imagination has something to do with it. The pass over which the men in the market had come with their furs is 17,000 feet high, 1300 feet higher than Mt. Blanc, and above the pass Kinchinjanga towers higher than the Untergabelhorn does above the sea. For all that, the elevation of Kinchinjanga above the line of sight at Darjeeling is really very slight, — less than 5°, we were told.

The weather at Darjeeling is no more settled than in other

mountain regions, — rather less so, it seemed to us, for there is so much to see, and the chances of going there again very soon are so small. If it is fine in the morning, it is sure to cloud up later in the forenoon; and if it is foggy, it is sure to clear away when it is just too late to start for Senchal, and in that way we lost the sight of Mt. Everest. It is not much to see, we were told, — just a little white peak looking over other snow mountains, so much nearer that they seem quite as high. Still it is probably the highest point on the earth's surface, and we should like to have seen it. We started one morning, feeling sure that we could at least reach Tiger Hill, the nearest point to Darjeeling from which it can be seen; but we had scarcely reached Jalapaha when we saw clouds rising in the northwest, and though we went on for the sake of the views of the valley and the foothills, there was not a snow peak to be seen when we reached Tiger Hill. Jalapaha, where the English barracks are situated, is two hundred feet higher than Darjeeling, and has a wider view. The eye travels downward for five thousand feet into the valley of the Runjit River, and then up again over forest-clad hills and mountains, up the snowy side of Kinchinjanga, across snows and glaciers, and the bare wall of white rock that divides the summit until the highest peak is reached, twenty-eight thousand feet above the level of the sea. To the west lie Kabru and Jannu; beyond comes a line of black rugged peaks, — low mountains only fifteen thousand or sixteen thousand feet high, — and then the view is cut off by some nearer hills that hide Everest. On the right is a continuous snowy range reaching all the way round to the east along the entire northern border of Sikkim and Bhutan, with Donkia and Chumulari standing out conspicuously among lower peaks. As we watched, the clouds gathered, and one by one the mountains were hidden; and we did not see them again until two days later, when they came out as if to say good-by to us when we left for Calcutta.

Certain Mountain Scenes in Greenland.

BY ALBERT WHITE VORSE.

Read January 9, 1896.

MOUNTAIN-CLIMBING in Greenland is not dangerous ; it is not even difficult. Perhaps neither Mr. Conway nor Mr. Whympers would deem a Greenland peak worthy of his hobnailed shoes. There are probably no inaccessible summits in the land ; to be sure, there are numberless impracticable precipices, but always there is some rather easy roundabout way of reaching the crest. There are no immense elevations to be attained ; the loftiest peak in Greenland is less than eight thousand feet high. "Hardly worth climbing," a member of the Alpine Club might say ; and yet it is worth climbing, and so are most of the lesser Greenland mountains, for their summits command views the like of which are overlooked by no mountains outside the polar regions. In other parts of the world you can get views of mountains and sea together, but nowhere else can you find mountains, sea, and ice. Among the Alps you can enjoy the sunset light or the sunrise light, but only in the far North or the far South can you have both the sunset and the sunrise glows at the same time.

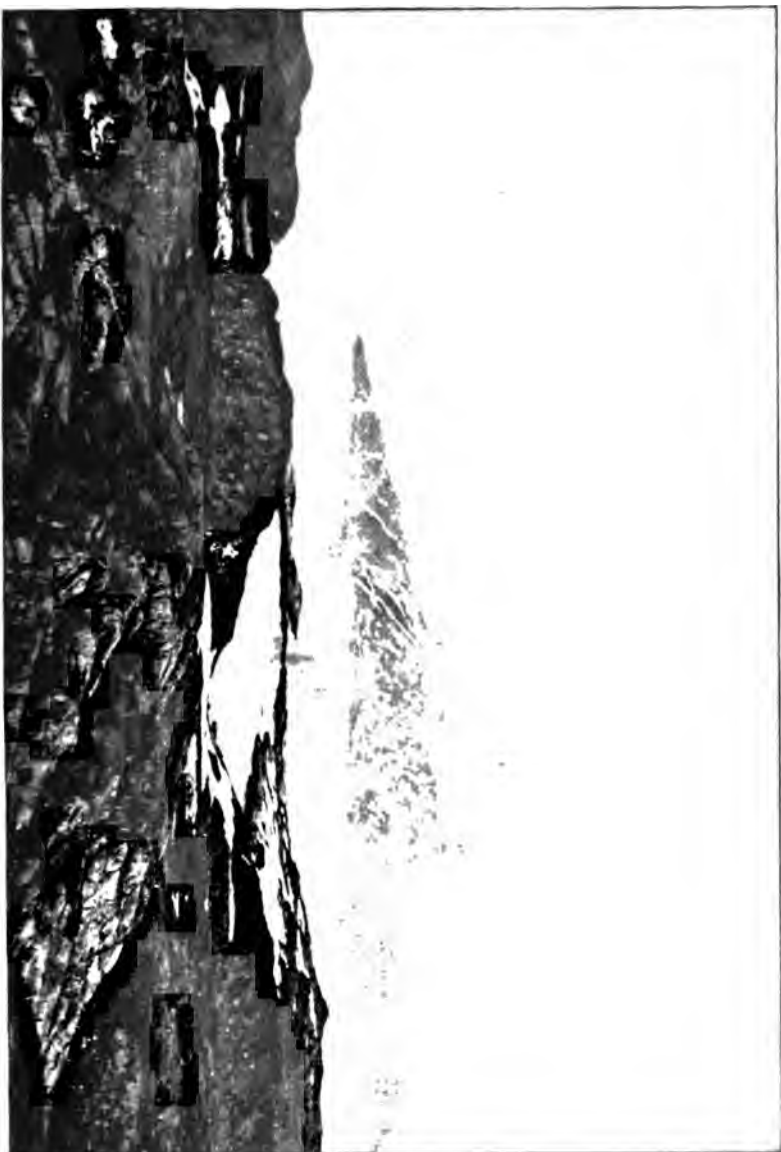
What you miss in the North—a little in Norway and Alaska, where the mountains are wooded with spruce, and a great deal in Greenland, where there are no trees at all—are the lights and shades of the foliage. But on the other hand you have the play of light on rugged cliffs, and on black, snow-streaked crags. If in Greenland you do not revel in Nature's luxuriance as you do in Greece or in India, at least you never lose the consciousness of her sublimity ; and, after your first midnight glimpse of the sunlight falling upon the white glaciers and upon the shimmering mists above the ice-cap, you feel that, beside this exquisite beauty, tropical gorgeousness is grossly unworthy.

At first sight the mountains of Greenland are grim enough. As every one knows, the whole country is lofty,—all, that is, but intermittent strips of land along the sea, from a quarter

of a mile to three miles wide. Behind the strips — or in many places directly out of the water itself — rise the cliffs, to the height of a thousand, two thousand, five thousand feet. Nowhere in Greenland is there any lack of high land to climb.

In the south the geological formation is granitic, and black and jagged enough is the sea-wall. Here there are a few isolated peaks. The highest, I believe, is the Saddle, near Godthaab. It rises somewhat over six thousand feet, from among low foothills. With its double peak, it bears some slight resemblance to the object for which it has been named. The likeness is not striking enough to take from the dignity of the mountain. Its black sides, even in winter, I am told, frosted but lightly, — for, like the Matterhorn, the peak is too steep and too often swept by ninety-mile winds to accumulate much snow, — are, as it were, omnipresent in one's thoughts in Godthaab. If you turn your gaze inland from the town, it is at once arrested by the mountain; if you look out to sea, you are always aware that the Saddle is behind you. Even the Eskimos, whose appreciation of scenic effect is small, are impressed with the presence of the mountain. The native photographer — Godthaab is disgustingly civilized — is always "taking shots" at it, and our illustration is reproduced from one of his pictures.

Whether or no any one has flagged this majestic peak, I do not know. The Peary Relief Expedition did not. Its mountain-climbing was all performed either at Disko, or still farther north. There the formation is chiefly basalt, though north of Cape York there are bluffs of granite, of sandstone, and of shale. But, for the most part, above Cape York you come upon a succession of square-cut basalt promontories. Their summits are worn off level by ice-action; their precipitous brown sides are serrated with weather cracks; their bases broaden out gracefully in talus. This form of cliff is so frequent in North Greenland that it might perhaps become monotonous did not each particular promontory have some arresting feature of its own, some odd pinnacle, or some curious streak of foreign rock. There is a wonderful sea-cliff just north of Cape Saumarez. It rises between two glacier-worn valleys, and the sides are terraced three or four times; the



THE SADDLE. NEAR GODTHAAB.

From a photograph by a native photographer.

effect from abreast of the cliff is something like the effect of an Assyrian fire-tower, though the terraces are not so broad as were those of the buildings. Across the façade of this cliff runs horizontally a broad stratum of red granite, and two other red strata traverse the entire face in the form of a St. Andrew's cross. Imagine the effect of this cliff as we saw it one glorious morning from the "Kite," plunging through a brisk sea, that dashed the spray over a hundred shining little icebergs before it foamed up the base of the cliff. Imagine, in the setting of the blue and white sea below, and the blue sky above, this dark wall, a thousand feet high, crested with snow, and traversed by the vivid red band and cross.

The prospect from one of these cliffs over the sea directly below you is delightfully odd. The south side of the famous Lyttleton Island is a great granite staircase, with giant steps. Several members of the expedition climbed Lyttleton Island, from the north side, by way of an easy valley.¹ We came out on a fine eastern promontory, commanding a magnificent sea-view in three directions. But what interested us most was a bay to the southward, because there the "Kite" was to await us. So we left in an old cairn — erected perhaps by Kane — a record of our visit, and marched across the level to the southern edge of the sea-wall. There was the bay, perhaps three miles wide; but between the lofty walls it looked but a gunshot. Out toward the centre lay the "Kite." We could look down into her stubby little funnel; if we had been good shots, we could have tossed a pebble into the crow's nest on her foremast. Presently black little figures of men appeared moving rapidly about the ship's deck. Then a sudden puff of white smoke burst from over the starboard bulwarks. The water was still as a mill-pond; we could see the white splashes as the bullet ricocheted toward the shore; and near its first splash were

¹ I have purposely omitted mention of the flowers, plants, and lichens that we found on Lyttleton Island and elsewhere. Mr. William E. Meehan, the botanist of our expedition, made valuable collections. The result of his work he has embodied in an excellent report to the Academy of Natural Sciences, Philadelphia. It is to be found in the P. A. N. S. Proceedings, under the date of April 23, 1893. The vegetation was abundant everywhere; we found poppies, potentilla, dryas, saxifrage, dwarf willows, dwarf birches, huckleberries, — nearly a hundred varieties in all.

half a dozen black objects that, we guessed, were the heads of walrus. There were more puffs of smoke, and presently from around the stern of the ship came the white boat. The rowers were bending to the oars with all their might; the boat seemed to slide over the glassy surface. During the next fifteen minutes, cheering with excitement, we were spectators of as spirited a little fight as you could wish to see. It was the oddest sort of an experience. From our lofty seats—if you can call by that term a slab of rock upon which one is crouching on hands and knees, to be as near as possible to the field of battle—we could observe every detail of the contest; we could see the walrus forming ranks again and again and charging the boat; we could see the men gathering, forward, to receive them; we could see the rapid puffs of smoke; we could see the arm of Daniel, our harpooner, straighten, as the Eskimo delivered his weapon; we could even see the gleam of white bellies as the wounded walrus turned, swimming beneath the water. Yet so far above the sea-level were we that the detonations of the Winchesters came to us only as slight thuds. It was a wonderful little scene.

Presently the excitement induced action; we must needs clamber down to the water's edge, in the hope of finding an opening in the arena for ourselves. It was a vain hope; long before we reached the bottom the shots ceased, and, indeed, after the first ten minutes we were so much interested in our own fate that we forgot all about the fight. At first the going was easy; the cliffs that looked steep from the sea were in reality jagged enough, and we could swing or jump from one shelf to another without difficulty. After a while, however, we came to a sheer leap from an overhanging rock to a shelf, perhaps eight feet below. The leap was not difficult, but once down there was no going back. And presently we were put to it sorely to find foothold at all. We had to take greater leaps, and to squeeze along narrow shelves, and to slide down little gorges amid the great rattling of many small pebbles under us, which, acting as ball bearings, alarmingly facilitated our progress. This sliding is not good for the trousers. Finally we arrived upon the edge of the last little precipice. Below us was a terrace that sloped gently to

the sea. It was perhaps twelve feet below us, and that was nothing; what was of more importance was that it was covered with long grass, and it looked slippery. None of us wished to be shot across some yards of grass and slimy rock into the black water.

For the sake of dramatic interest, I wish I could report that one of us did slide into the water. But the fact is, that the grass was not unduly slippery, and, very soon standing by the sea, we were whistling vehemently for the boat to come and take us off. The most serious mishap on this excursion fell to the writer. Being thirsty, he sought a stream. In Greenland, during the summer, there is everywhere water in abundance, and of the very best. Just above the lower edge of the grass was a steep bank of hard snow, and hollowed out of the bank was the most delightful tiny grotto. The entrance was just big enough to pass your head, but inside the little cave rounded out prettily: it would have held a large punch-bowl. The inside walls were blue, and from them fell diamonds of water into a transparent little pool. "This is the drinking-cup of Ting-wi-huk-suah, the Great Spirit of the Arctic," remarked the writer, and himself drank two vigorous swallows. The grotto is half submerged at high-tide.

I have said that climbing in Greenland is not necessarily perilous. By that I did not mean to imply that you could not by chance get into ticklish situations. There are plenty of chances for that. Two members of the Peary Expedition of 1891-92 found themselves, one winter day, upon a rock half-way up a snow-covered bluff. They tried to descend, but the snow was hard and slippery, and after a few moments they gave it up. One of them dropped his snow-shoe; it glissaded down the slope, and went to flinders on some sharp rocks five hundred feet below. The men glanced at each other, and then set to work to climb to the summit. The pitch of the snow increased, and the men had to cut steps. As a tool they had only the remaining snow-shoe. They had to proceed in single file, one man above cutting steps, the other below supporting his comrade as best he could, and digging his toes for life's sake into the little niches. They

arrived safely at the crest; but the ascent took several hours, and both explorers assert warmly that they were hours as unhappy as any the Peary party endured.

That was in winter; we, in summer, had several minor mishaps. The writer remembers clearly a glissade — some say an involuntary glissade — at full speed down a hard snow-bank, four hundred feet wide, ending just over a vicious little glacier torrent. He was seated during the passage, and his gun was tangled in his legs. Fortunately there was a patch of soft snow on the way to the stream.

Another member of the party went through what might have been a serious adventure, on Disko Island. Behind the town of Godhavn there is a gap in the hills called Blaesedale, — windy valley. Through this valley, in a deep bed which it has cut, growls along a fierce, red torrent, — the meltings of several glaciers. If you follow the river along the top of the bank, you will come to a spot where the bed is a mere cleft in the hills, and if you follow the cleft, you will at last look down into a sort of enormous pot. Into this pot, from nearly your own level, the river plunges with a great uproar; the height of the falls is two hundred feet. The black sides of the pot gleam with spray; the red slab at the bottom boils and seethes; the effect is infernal. It is like an illustration of Dante's poem, done by Gustav Doré; in fact, much of Greenland might have served to give Doré his conceptions.

Having taken from above several photographs of the falls, one member of our party thought he should like an exposure from the bottom of the cleft. So, with two cameras — one his own, the other that of a friend — he walked down stream till he found a practicable slope to the stream. Once at the bottom, he discovered a little beach alongside the water, and on this he proceeded through the gorge, nearly to the falls. There he made his exposures, and then, loath to retrace so many steps, he determined to climb the side wall. He ascended fifty feet or so, and then a rock gave way beneath him. He sprang to a shelf, not four inches wide, and clung with his hands to imperceptible crannies. There he hung, and other members of his party came to the summit of the cliff and looked down, — absolutely helpless. There was not

a rope within miles, and the first attempt to reach him from above nearly dislodged him with small stones. The treacherous rock beneath him began to crumble. With admirable coolness he found a firm hold for one of his hands, and with the other unslung one of the cameras and hung it on a knob. Then, by the sheer power of his fingers, he raised himself till he could lie at a safe angle upon a slanting rock. Thence he reached level ground without much difficulty. The camera swung precariously till another member of the party, lowered by a rope, recovered it.

Of adventures on glaciers we met with surprisingly few, yet we made many traverses and ascents. For observation of glaciers, Greenland is, of course, the land to seek. There, on the shores of almost any bay, you can find every form of the glacier; and the Aletsch Glacier and the Muir Glacier are but as rivulets, compared to the vast ice-streams that descend from the Greenland ice-cap.

Our experiences with them were varied enough. Our first ascent was made upon a huge leviathan of a glacier that came crawling out of a valley into Sonntag Bay. As every one knows, you never can throw off the idea that a glacier is alive. Perhaps that is because it makes such a deafening noise. However that may be, this particular monster seemed more alive than any other we saw, because his vast whity-blue flank was pierced, and from the wound sprang a heavy crimson jet, as if an artery had been severed.

It was upon a glacier that we passed through the most "arctic" of our experiences,—a stiff snow-squall. We had ascended the Sun Glacier, at the head of McCormick Bay, to a height of about seventeen hundred feet. Above us the mass rose yet two thousand feet higher, billowing up from us, between lofty precipices, toward a distant, tiny notch, clear-cut against the horizon. Midnight was yet some hours away, and the sun was not very low; yet so high were the walls between which flowed the glacier—here, perhaps, four miles wide—that they threw a shadow quite across the surface of the dead-white ice. The sunlight fell, however, upon the upper half of the eastern precipice, and thence, from crimson lichens and bright mosses, there came to us evasive

glintings of warm yet delicate hues of green and red. Opposite our position, through a gap in these walls, a branch glacier flowed abruptly down to join our own river of ice.

Beyond the highest point of this tributary shimmered away and away into the mists the ice-cap. At any time the ice-cap is impressive in its mysteriousness, but upon this evening it was particularly awful: its farthest gleam was so distant and so high that it might have been the reflection from a cloud.

Below us the glacier descended in gentle undulations to the azure bay. A stiff breeze was blowing down there; we could see the bright blue deaden as the gusts swept over it, and we could catch the spray-flashes as the waves dashed smartly upon thousands of quaint, floating ice-shapes.

Above the cliffs, across the bay there was forming such a tremendous atmospheric spectacle as one does not see twice in a lifetime, outside the Arctic regions. The mists had risen from the sea till they covered half the sky. Within them, mere shadows, loomed portentous piles of white cumulus. The mists ascended rapidly; the masses of cloud piled one upon another, thrusting out toward the zenith, in quick succession, thick fingers and arms. Within a few moments the whole sky was gray; the bay turned black; the light on the cliffs went out. Tiny flakes of hard snow began to fall. Of a sudden, down the glacier, rolling the snow before it, swept the wind. Immediately everything was dim. The tiny snowflakes beat, stinging, against our cheeks and against our half-closed eyelids. To face the storm was impossible. Even when we turned, we at times could barely see the cliffs. By the tributary glacier, the gusts whirled the snow up the corners in sudden columns and clouds, then, passing on, allowed the rock to emerge for a moment clearly, to be shut out altogether the next moment by a snow cascade falling from the summit of the cliff. Of the bay and what lay beyond nothing was to be seen.

For nearly half an hour the wind screamed in our ears, and the snow beat in our faces. We drew up the hoods of our sealskin coats, grasped in our right hands our alpenstocks, and in our left hands the glacier rope, and digging

our ice-creepers into the surface of the glacier, we plodded doggedly on. I think most of us spent the time in remembering that this was but a summer squall, and in wondering what a traveller did when the temperature was fifty below zero, and the wind blowing sixty miles an hour.

At last there appeared a thin place in the mists; then a patch of blue sky; then, all in a moment, as it seemed, the wind abated, the snow ceased, the clouds passed away. The bay, with its white icebergs, framed in by the square-cut cliffs, was again a blue picture; in the centre glanced the wing of a great burgomaster gull leaving his lofty nest. Again the eastern wall of the gorge was lighted up. But no longer was it green and red; the storm had thrown about its rugged crest an open-work veil of white.

Tramping and Camping on the Great Range.

BY ZILPHA D. SMITH.

Read December 12, 1894.

ON Tuesday morning, the third of July, the sun rose on Mt. Washington over a sea of white clouds, with black mountain peaks breaking through here and there, and bright blue sky overhead. I did not look at the weather afterward, and at seven was surprised to find a thick mist, and that only seventeen of the field-meeting party of 1894 were on the train for the head of the Great Gulf. Five ambitious spirits were to go over the northern range to the top of Mt. Madison, and return that night; two to Spaulding's Spring and back; and the other ten, four of them women, were to spend the night at the Madison hut, returning the next day.

We followed the painted trail over the humps of Mt. Clay. There are three of these on the map, — in reality five, I am sure, — and they seem ten in going over them, as one gets nowhere, and the climbing is hard.

The mist had turned to rain, with occasional sidelong pelting showers, and we could see not more than fifty feet

over the rocks. The guide, Mr. Hubbard Hunt, led us by Mr. Edmands's unfinished paths around Mts. Jefferson and Adams. The five Madison men had pressed on ahead. The other party of twelve kept close together in Indian file. On Jefferson we were as wet as we could be; but on Adams we were wetter, and the water oozed out of the seams and buttonholes of our boots at every step.

We were a sorry-looking set, when at quarter past twelve we reached the Club Hut, after seven miles and a half of rough walking above tree-line. The hut seemed pretty full already, with the five men who had intended to go to the top of Madison; but they had a good fire ready for us, and we crowded in, standing about the stove in our wet clothes, eating luncheon out of half-soaked boxes. The provisions for future meals were safe in Mr. Hunt's waterproof pack. The Madison and Spaulding's Spring men, seven of them, — for the latter had kept on to the hut, — soon started back to the Summit, and must have had a wetter walk even than in the morning.

Ten remained. We looked at each other and at the little hut. Ever getting dry seemed hopeless. The railroad tickets back to the Summit were soaked, and almost beyond recognition; maps were off their mountings, and there were few articles of apparel that were not thoroughly wet.

Should I go on describing the woes of those three happy days, — the wind, the cold, the rain; the shoes that gave out; the rations, good and plentiful, but short on bread and long on meat; the cracked wheat that had to be stirred for two hours because we could n't find the other part of the double boiler (at bedtime it turned up in one of the bunks), — should I tell of all these, and more, only a true "Appalachian" would realize what a good time it meant. Even our fellow-members at the Summit House were pitying us; but we in turn pitied them, shut up in a hotel with nothing to do!

There was a brighter side to even the first day, the wettest of our tramps. We were in the best of spirits, and our rainy way was beguiled by charades, stored in the memory of one of the gentlemen. Just before we reached the hut, the

clouds opened over the lovely valley of the Androscoggin far below us. Within, shawls curtained off two tiny dressing-rooms. There were many strings of wet clothing, which gradually grew less; and by the time the afternoon rain was over, we women were dry and comfortable. I doubt if the men got dry that night, but no one seemed to catch cold.

After supper we climbed the cone of Madison to see the sunset, and registered there at five minutes of eight.

The bunks in the hut were freshly filled with balsam tips, deliciously soft and sweet. I was never more comfortable, nor more wide-awake. At half past three I slipped out of doors into the early daylight, startling two clumsy black and white porcupines, who dragged themselves off under the scrub. From the ledges above Star Lake, with the ravine below me, Mt. Washington looked very near and clear. It seemed the loveliest sunrise of the four we saw that week, perhaps because I was alone amid the silence and the stern beauty of the rocks. The sun itself was behind Mt. Madison, but the clouds were many, and varied in form and color, — a huge bright pink one floating high over Washington, with ethereal hands lifted higher still.

The evening before we had discussed plans, and all agreed that if shoes gave out, or if it looked like rain, we should go directly back to the Summit House on Wednesday, as Mr. Hunt and one other would do in any case. But on Wednesday, after we had climbed Mt. Adams in the clear cold windy air, when rain threatened, and rips and holes in plenty appeared in boots not yet dry, our solemn decision was forgotten, the inspiration of that topmost air carried us along, and no one suggested going back to the Summit. We passed Wednesday's party making the same trip to the hut under pleasanter skies, and then dipped down the great side of Adams to the Perch, and after lunch and a shower there, down Israel's Ridge to the Cascade Camp.

These two camps, built by Mr. J. R. Edmands, are ideal birch-bark shelters, open on one side toward a stone fireplace, convenient and comfortable. The situations are beautifully chosen, both having, close by, outlooks over the Jefferson valley. The Perch is especially picturesque,

and stands high on the steep side of Adams, hidden at the end of a forest path. The other camp is on a level spot near the brook which gives the ravine its name, — the Ravine of the Cascades.

The shower while at the Perch had delayed us, and spoiled our plan, which was to go down to the Cascade Camp and back again before supper, carrying no luggage. Those who had been over it last year warned us that the very steep path would be in woful condition after the shower, — trees wet, mud under foot, long places to get down, where one step would be four or five feet below the last. But as they also said the Cascade Camp would be larger and warmer, we started on, and found that the three worst places had been bridged with wooden steps, and the path well cut out, so there was none of that wetting from bushes, which is worse than rain. There was red mud; but who cared? Such beautiful woods, untouched by lumbermen! White and yellow birches and fir balsams hid the sky; and under them rocks, mosses, oxalis, ferns, — a luxury of growth far above and far below us. At the camp we left our traps, and spent an hour or two at the three groups of cascades near by. Their sylvan beauty seemed to belong to another world than the rocky heights whence we had come.

We watched from the Overlook the sunset light in the valley, softly singing patriotic songs, — for it was the Fourth of July, and we had been wearing all day the little flags Mr. Crosby had thoughtfully sent on for us who were to be away from the Summit on that holiday.

It was a new and weird experience that night to lie before a fire of great logs. The men stole silently up to it one after another to put on more wood, — I did not realize at the time how much hard work that meant, — and always there was the murmur of the cascades.

Thursday morning the weather was exceedingly doubtful. We got up at four to make an early start, but it was quarter of nine before we decided the momentous question, whether to go down to the valley and round to the Summit by train (with the risk of long waits at several junctions, where our tramping-clothes would be stared at by summer boarders),

or to go over the range, expecting to get wet. Meantime we were happy, especially while we lingered in the Overlook, watching the sunshine on the Jefferson valley and the lowering clouds above, singing and mending. At last we took a secret ballot, each to vote his personal preference, and the result was a unanimous vote in favor of the walk over the range. The rain came while we were climbing to "The Perch." There we rested, ate, talked, watched the fire, — drifting from the gayest to the most serious subjects and back again. In spite of the fire, it was too chilly to linger long, and we started on to find Mr. Edmands's new path to the head of the Ravine of the Castles.

We had good cause to be grateful to Mr. Edmands, not only for the hospitality of his camps, but for these paths. Though unfinished, they were comfortable, and, with care, easily followed. Had we been obliged to take the painted trail over the summits, we should have seen nothing that day. Thanks to the new path, our walk around the Ravine of Castles was the most glorious of all. Deep below us a faintly traced break in the forest showed where the river ran. On the ridge of Jefferson opposite rose the rocky Castles, now black against sunny gray-green mountains, and again in sunshine themselves, while all the rest was in shadow. Mt. Bowman's wooded dome closed in the foot of the ravine. Beyond, the clouds still hung low, and far away under them, over a sea of nearer mountains, rose distant peaks, — were they the Adirondacks? The farthest distance was clear and marvellously blue, fading and blending into the nearer greens, — a wonderful effect of color.

When we reached the col between Adams and Jefferson, the wind swept through strong enough to blow one's arm out almost horizontally. The thermometer stood at 40°. How exhilarating it was!

Jefferson, like the other higher mountains, was in cloud. Again we took the Gulfside path; but this time the clouds broke again and again, and each glimpse of ravine and valley and the mountains beyond was greeted with a shout. The cloud shadows flying over the woods on the Carter Range were deep blue.

There were the interminable humps of Mt. Clay again; but now Clay showed its beauties, too, especially one narrow cleft, opening down to the lake in the bottom of the Great Gulf. Here we were decorated with wild-flowers,—the geum, Labrador-tea, cornell, housatonia, and the pink bells of the mountain cranberry. With our flowers and our flags all in evidence, up the cone we went through the mist, and at 5.20 marched along the platform of the Summit House, singing "Tramp, tramp, tramp," and "Johnny comes marching home again," like a parcel of children.

Bibliography.

RECENT EXPLORATIONS.

CLIMBING AND EXPLORATION IN THE KARAKORAM-HIMALAYAS. By WILLIAM MARTIN CONWAY. With three hundred illustrations by A. D. McCormick, and a map. New York: D. Appleton & Co.

DIARY OF A JOURNEY THROUGH MONGOLIA AND TIBET IN 1891 AND 1892. By WILLIAM WOODVILLE ROCKHILL. City of Washington: Published by the Smithsonian Institution.

LES ABIMES, LES EAUX SOUTERRAINES, LES CAVERNES, LES SOURCES, LA SPÉLÉOLOGIE. With upwards of three hundred illustrations. By E. A. MARTEL. Paris: Charles Delagrave.

Three very important volumes treating of explorations have been published since the last issue of *APPALACHIA*, representing three different departments. Mr. Conway's volume is a record of exploration among mountains and ice-fields; Mr. Rockhill presents a diary of exploration on the tableland of Tibet; while M. Martel's book treats of the reverse of mountain-climbing, the descent into caves.

Mr. Conway's book is not the mere setting forth of what he saw; it is a charming and consecutive story,—a day-by-day record, it is true, but one so filled with features of novelty as to present the interest almost of a romance. The region which he traversed, the Karakoram-Himalayas,—that high mountain-chain which defines the boundaries of Northern Hindustan and Tibet,—had never been entered by more than two earlier explorers. There is, therefore, in his story every element of novelty and interest.

The volume is unique in many ways. There is especial interest in the country which he visited,—interest to mountaineers, since the highest mountains in the world lie here extended in the giant Himalaya chain; interest to explorers; for this country borders Tibet, that land which has been closed to travellers from earliest history. Mr. Conway presents many aspects of this strange region. He has an eye for the natural features, the scenery, botany, geology, and zoölogy of the land, not forgetting in this last department the manners and customs of the genus *homo*, which he took every opportunity to study.

The exploration itself was a wonderful one. With so large a party, numbering at times nearly one hundred, one must admire the executive ability which could preserve harmony among its members; the more so in a region of perpetual ice and snow, where

out-of-door camps for days and weeks together meant hardships of which the story gives little more than a hint. The position was the more difficult since the porters were but poorly provided to withstand the rigors of the season.

The faithful band of explorers entered the mountain district at Srinigar, known on the older maps as Cashmere, or, in the newer orthography, Kashmir. Thence the party went north to Gilgit, where the real mountain-work began; then easterly along the Karakoram mountains, passing here throughout the entire length of the three longest glaciers in the temperate zone, — the Hispar, the Biafo, and the Baltoro. For nearly three months altogether the party was encamped above the snow-line, making in this time many of the higher passes, and ascending to the summit of Pioneer Peak, a spur of the Golden Throne, a height of some 23,000 feet above sea-level. This is, in all probability, the highest point reached by man on any mountain.

The book, from its beginning to the close of the final chapter, is full of interest and charm. The author is an observer who lets not the smallest thing escape him. The architecture of the country is critically discussed; the people, — their intelligence or stupidity, their religious and social customs, — the roads and paths, the mountains, the camp, and the porters. The setting forth of remarkable adventures is done in the most modest manner, rather belittling the results except to those who have had experience for themselves above the limit of eternal snow. Political economy, antiquities, history, tradition, folk-stories, — all are gathered here, and this in a country substantially unknown to us, where every fragment of information has hitherto been treasured. The world is indebted to Mr. Conway, not only for his exploration, but for his book; for too often these charming stories are hidden from all but students, in the musty archives of some institution or society of learning.

In his story, Mr. Conway does not adopt the principle of claiming all the attention; he does full justice to his companions. The sturdy Bruce is an important figure; an Englishman of most attractive type, a strong, quick-witted man, full of expedient, and ever ready with a much more important matter than advice, — assistance. To him the ascent of a towering snow-peak was but a bit of fun, the fording of a raging mountain-torrent but a pastime, or the skipping back over half a day's progression after a forgotten tobacco-box or match-safe but a delightful ramble.

Second only to the narrative of Mr. Conway comes the pictorial story of Mr. McCormick, who at every point in the journey was ready with brush or pencil to note the striking features. To the number of three hundred, these sketches illustrate the superb volume, — the tenuous rope-bridges over which Mr. Conway went roped as for an alpine glacier, the mountain tops thousands of feet in altitude, the villages, the torrents, and the camps. Too much praise cannot be given the faithful work of this member of the party.

The volume is presented in splendid style — perfect in typography, artistic in the selection of the illustrations — by Messrs. D. Appleton & Co., of New York. It is the most considerable and important addition of the decade to the literature of the mountains.

The second volume, which is entitled "*Diary of a Journey through Mongolia and Tibet in 1891 and 1892* by William Woodville Rockhill," is issued as a special publication by the Smithsonian Institution, the journey having been partly under the auspices of that institution. The volume is a simple diary, without embellishment, of a most remarkable journey and exploration over a route of nearly four thousand miles through an unknown country, and which required for its accomplishment upwards of a year. The traveller actually conducted a survey, so that his data are quite accurate. He gave attention to the physical and geological features of the country, meteorological observations were taken three times each day, and a camera was carried; so that a mine of information of greatly varied character is afforded concerning this country, regarding which so little has heretofore been known. Too much praise cannot be given the author for the faithful and accurate work which he has accomplished.

Mr. Rockhill's journey began at Peking, tracing a general westerly line through the province of Mongolia, then striking the Hoang-Ho, or Yellow River, at the apex of its great northern bend, and following this stream practically to its sources. Thence the journey lay westerly into Tibet, to the geographical centre of which Mr. Rockhill penetrated. Here, when but a few days' march from the capital, Lh'assa, — that unattainable goal of explorers in all ages, — the authorities turned him from his course, and he was obliged to make a southerly return through China, reaching the coast again at Shanghai.

Although explorers have sought Tibet for five and one-half centuries, and attempts innumerable have been made to enter that land, so strong has been the wall of conservatism and prejudice that those who have succeeded can be counted almost on the fingers. Lh'assa, the capital, is wellnigh inaccessible. Near the beginning of the last century the Jesuit Fathers Desidiri and Freyre reached this city, and remained there more than ten years; and during their stay others penetrated and established a mission. In 1811 Thomas Manning reached Lh'assa, and in 1846 the Lazarist Fathers Huc and Gabet. Since that date no foreigner is known to have entered the capital.

Mr. Rockhill did not undertake this journey a novice. A previous expedition, already described in "The Land of the Lamas," which was accomplished half a dozen years ago, was a most excellent preparation. The earlier portion of the present journey was through Southern Mongolia, — a region still less well known than Tibet, only two or three explorers having traversed it; while through Central China, although better known, the explorations have been by no means numerous. Thus at every point of his journey Mr. Rockhill was traversing country little known to us, and the fulness of his gathered information is the more acceptable.

The country visited was high and mountainous. Rising from the level of the sea, in two months from Peking, in February, 1893, the general level was from seven to eight thousand feet; in March it became from ten to twelve thousand; in May, fourteen thousand feet; June and July, fifteen to nearly seventeen thousand, diminishing from that time. An altitude like this meant much in hardships for the little party.

As to the story, it is of the simplest nature. There is not the slightest suggestion of "traveller's tales." It records the every-day life of the expedition, the nature of the country, the people, their habits and modes of life, their dress, amusements, and social qualities, the government, and all those petty details which go to make up in our minds the estimate of a people.

The volume is well arranged and well printed. It is furnished with an excellent map, reduced from the original made during the journey, which was on a scale of four miles to the inch, the instruments upon which it depended being a sextant, an aneroid, and a prismatic compass. The volume has also a number of appendixes, a vocabulary or two, a list of the plants of Central Tibet, a table of altitudes and latitude observations, and other matters of scientific value and importance, and is embellished with many photographic reproductions of scenery, inhabitants, or of objects collected.

The third of the explorations in a new and unusual field is the investigation of caves. Of such explorations there have been comparatively few, and there is a consequent dearth of books and literature on the subject. For these reasons the investigations of M. Martel are particularly to be commended, and the publication of his results is the most considerable contribution ever made to the story of the underworld.

In a few of the caves of the world remains of man and animals have been found, and of such places quite full accounts have been written. Others have become show-places, and are visited by the curious. Two investigations, special in their nature or of possible utility to man, have been made, — that of Mr. Browne, who visited many ice-caves, and that of the Austrian government, which sought to find sources of water-supply in cave rivers; and these are about the only studies worthy of mention.

The field which M. Martel has selected is therefore practically unoccupied, and in the development of a systematic method of exploring it, he has done great service to science. For ten or fifteen years he has been devoting his spare time, his funds, and his energies to underground exploration, in his own country (France), in Austria, that "classic land of caves," in Greece, and in other countries; and through his example he has gathered around him a little band of explorers, vying with himself in activity and energy. The present volume is a portion of the results of this work.

"*Les Abîmes*" is a quarto volume of nearly six hundred pages, printed in the French language, and presenting more than one hundred views, and upwards of two hundred plans and sections. Two hundred and thirty caves have been visited, the greater number of them previously unexplored; while some fifty linear kilometres of cave-floor have been mapped, more than half of the latter by M. Martel personally. The explorations and researches have been carried on in the most systematic manner; apparatus being devised and secured for every possible contingency. There are copper wires and ropes which, by means of derricks, permit the lowering of the explorer to the floor of the vertical "puits" which abound in France,—distances of one hundred to five hundred feet,—while rope or wire ladders give access to lesser depths. Smaller derricks are ready to be lowered to intermediate points within the shaft. There is an instrumental outfit, torches and lights, a camera and magnesium powder for the photographer's use, a telephone with which to communicate with the base of operations, and, when needed, boats—light, portable American boats—with which to explore the underground rivers. Then there are many minor necessities or conveniences,—deodorants, for example, for these caves are many of them traps and pitfalls for the unwary beasts of the forest. Thus splendidly prepared, M. Martel has been able to make the most of his opportunities, and the excellence of his outfit has left its impress on the quality of his work. His plans alone, without a word of explanation, would be a contribution to our knowledge of which any man might be proud, while the illustrations and photographs of these places of eternal darkness add much to the interest of his story.

"*Les Abîmes*" is comparable to no other book; it is an exceedingly creditable testimonial to the skill and zeal of its author, whose good work is by no means at an end, since his enthusiasm and example have raised up in his own country a Cave Society, instituted within the half year, from which valuable results and reports may be expected.

J. R. JR.

MOUNTAIN EXPLORATION. By EDWIN S. BALCH. Bulletin of the Geographical Club of Philadelphia.

The first number of Vol. I. of the Bulletin of the Geographical Club of Philadelphia consists of a noteworthy article on Mountain Exploration by a member of the Appalachian Mountain Club, Mr. Edwin S. Balch. Few Americans have such a record of mountaineering, including first ascents. It is gratifying to find that our fellow-member is a mountaineer rather than a climber, and that his impelling motive is not gymnastic, but æsthetic and scientific. The glories and the beauties, rather than the dangers, attract him to the peaks and glaciers. The author reviews the field open for exploration, the great mountain ranges of the world, and gives the meaning of many poetical names of mountain peaks. He describes the earliest Alpine ascents, due to a love of geographical exploration, botany, mineralogy, and geology, and cites examples of important scientific facts discovered in mountaineering. After mentioning glacial phenomena, botany, and zoölogy, he dwells upon the effects of the rarity of the atmosphere. Mr. Peary's reindeer suit, so light yet warm, may assist very materially in enabling the mountaineer to ascend the high peaks of the Himalayas. While appreciating the topographical accuracy of the photograph, the author prefers the sketch or painting. In the second part of the monograph Mr. Balch describes the requisites of a mountaineer,—physical skill, head knowledge, and practice,—and emphasizes the need of an

early start, a slow and steady gait, a careful reconnaissance. Rock travelling, step cutting, sounding for crevasses and tumbling into them, are described, as also the dangers from avalanches, falling stones, and especially storms. This very interesting and valuable paper closes with descriptions of sunrise views from the Gorner Grät and the Ortler.

R. B. L.

MR. BROWN: AN ALTITUDE HALVED. — In the *Geographical Journal* of London, vol. v. pp. 53-61, Professor Coleman, of Toronto, gives an account of his third attempt to reach "Mt. Brown and the Sources of the Athabasca" River in Canada. Mts. Brown and Hooker stand guard over the Committee's Punch-bowl in the Athabasca Pass, and have been credited with an altitude of 16,000 feet, which would make them the most important pair of mountains in the United States or Canada, leaving Alaska out of count. Mr. Coleman finds no record as to who determined the reputed heights, but finds them given in Keith Johnston's *Atlas* the altitude respectively of 15,900 and 15,700 feet, — the latter for Mt. Hooker, while Reclus gives the latter as 16,980 feet! The mountains were named by the botanist Douglas, who crossed the pass in 1826; but Mr. Coleman had not access to his account. If he had, he would have found no justification for the precision of the above figures, for in his diary (published after his death in Hooker's *Companion to the Botanical Magazine*, vol. ii.) Douglas merely says of Brown (which he ascended), that "its height does not appear to be less than 16,000 or 17,000 feet above the level of the sea," and of Hooker (which he did not ascend), that it was "nearly of the same height." Possibly Douglas's estimate may have been put on paper after seeing Drummond, whom he met a very short time afterwards, and who states (Hooker's *Bot. Misc.*, i. 190) that a mountain in that vicinity — it is impossible from the vagueness of his statement to say it was the same — was estimated by Lieut. Simpson to be 5,900 feet above its base, which, in Drummond's opinion, made it about 16,000 feet above the sea, showing the opinion then held that the passes thereabouts were 10,000 feet above the sea; this would account for the early estimate of the enormous height of Mt. Brown. That an estimate on such a foundation should have held its place for nearly seventy years, is astonishing. Coleman's party ascended Mt. Brown, and found its height by aneroid only 9,050 feet, and the height of the mountain occupying the position given Mt. Hooker on the map was estimated at only 8,000 feet, though "there are summits a few miles to the southeast that may reach 12,000 or 13,000 feet."

Mr. Coleman, who had already made two previous but unsuccessful attempts to reach the mountain, — once from the west by way of the Columbia, and once over nearly his last route, — left the Canadian Pacific Railway at Morley, just east of the Rockies, travelled with ponies, and with a canvas-boat as part of his outfit, northwest through the foothills parallel to the Palliser range, and then, following the Red Deer River into the mountains, crossed a pass at 6,500 feet, and descended to the Clearwater River, following it only a short distance; he then turned northwestward again, crossed another pass at 7,300 feet, and finally followed White Rapid Creek down to its junction with the Saskatchewan on the Kootenai plains opposite Sentinel Mountain. Up to this point he had followed the trail of the Mountain Stonies toward their northern hunting-grounds, but beyond this his route was practically on virgin ground. He turned past Sentinel Mountain up Cataract River, and crossed a divide of 7,550 feet, which brought him to the head-waters of the Brazeau, a large tributary of the Saskatchewan; crossing it, he went up another small valley to the northwest over a pass of 7,720 feet to the head of one of the feeders of the Sun-Wapta River, which brought him to a branch of the Athabasca. This he followed downward until he reached the branch which finds its source in the Athabasca Pass, when he again came upon abundant signs of previous travel, and soon reached the pass itself, the height of which, or rather of the Punch-bowl, he gives as 5,710 feet; it had before been estimated at 6,025 feet by Moberly. A route-map accompanies the paper.

S. H. S.

Report of the Recording Secretary for 1894.

ON Jan. 1, 1895, the corporate membership of the Club was 876. The losses amounting to 98, the accessions to 133, and two memberships having been revived, the net gain for the year was 37. The Honorary Members numbered 17, six Corresponding Members having been elected to Honorary Membership; the Corresponding Members numbered 52, twelve new names having been added. There were 79 Life Members. The total membership was 945, an increase of 49.

There were held during the year nine regular and three special meetings, and one field-meeting, the average attendance being over 100. At these meetings there were presented three reports, twenty papers, and ten short accounts of excursions in connection with the winter trip and the summer field-meeting. This year the White Mountains came in for the lion's share, having three papers in addition to the ten short ones just mentioned. The other papers showed the usual remarkable geographical distribution, representing Vermont, New York, North Carolina, the Appalachians west of the Mississippi, the Yellowstone Park, the Selkirks, Newfoundland, France, Austria, Jamaica, Venezuela, the Straits of Magellan, Hawaii, Korea, Java, and India.

A very successful field-meeting was held at the Summit House, Mt. Washington, N. H., June 30–July 7, and there was a camping-party at the base of Whiteface, at North Sandwich, in August. For further accounts of excursions and outings, reference is made to the report of the Excursion Committee.

The Snow-shoe section held its annual meeting in January. A few meets were arranged near Boston, and fine trips were enjoyed during the winter excursion to Jackson, N. H., in the latter part of February.

The annual social meeting was held at the Hotel Vendome on March 30. One hundred and sixty-five persons were present.

Only one number of APPALACHIA has been published,—Vol. VII. No. 3, in March. Other work in the line of pub-

lication has been undertaken, but nothing is yet ready for issue.

The Sella Collection of photographs has been successfully exhibited at Washington, D. C., Philadelphia, Brooklyn, New York, Bridgeport, and New Haven.

In May the Club received from Miss Helen M. Hitchings a large and valuable herbarium of American ferns, bequeathed to the Club by her father, the late E. H. Hitchings.

The most important event of the year was the passage of an Act by the Legislature giving additional power to the Club: —

ACTS OF 1894, CHAPTER 193.

An Act to enlarge the powers of the Appalachian Mountain Club.

SECTION 1. In addition to the powers heretofore given to the Appalachian Mountain Club, it is hereby authorized to obtain, by purchase, gift, or otherwise, forest and mountain lands, and places of scenic and historic interest, and to hold, develop, and administer the same.

SECT. 2. The real estate so acquired and held by the Appalachian Mountain Club, and used by it for the purposes set forth in the preceding section, and from which it shall receive no income or profit appropriated otherwise than for maintenance, shall be exempt from taxation.

SECT. 3. This Act shall take effect upon its passage.

APPROVED March 31, 1894.

Our By-laws have been amended, and a Board of Trustees of Real Estate has been created; but as yet no properties have been acquired, although the Trustees have spent much time in investigations and negotiations. The only real estate owned by the Club, the Madison Spring Hut and its lot, is now under the jurisdiction of the Trustees of Real Estate.

Respectfully submitted,

ROSEWELL B. LAWRENCE,

Recording Secretary.

Report of the Corresponding Secretary for 1894.

THE duties of the Corresponding Secretary of the Club are to a large extent in connection with the library, being principally the routine work in connection with the same, requests for exchanges, acknowledgments, and the like.

The present condition of the library is in every way satisfactory, representing, as it does, the result of a healthy growth in the department of mountain literature. In character it is unique in the country; and its value becomes more and more evident in the frequent calls from those who know of it in distant cities, who send quite often for information to be gathered from its volumes, and at times for the loan of the volumes themselves, which the best local libraries cannot always afford.

The growth of the collection, as is well known, is mainly through exchanges with other societies, APPALACHIA being sent to them in return for such volumes or pamphlets as are published by them. There are now some sixty-one institutions on our exchange list, which have furnished publications during the past year. A few periodicals, not more than half a dozen, are subscribed for, since they are essential to such a library, and cannot be secured through exchange.

The number of books and pamphlets received in exchange from the different corresponding societies is, so nearly as can be estimated from the accession-book, about eighty-five; the irregular way in which they are published — some in monthly parts, etc. — and in which they arrive, making possible a slight variation from this figure. Some eighty-two other books and brochures have been received, principally from the authors. Five volumes have been purchased, including all of the notable mountain publications of the year.

Of the books given to us, there is worthy of especial note the volumes by Whymper, "Travels amongst the Great Andes of the Equator," and the supplementary volume, presented by the author; while M. Edouard A. Martel has sent to the Club during the year his splendid volume, "Les

Abfimes," and some thirty pamphleta, completing for us the entire series of his papers to date, — a few minor leaflets excepted, which are now out of print. These papers and this volume form a most remarkable story of the underground explorations of this energetic Frenchman, who has made caves a study for the past twenty years. Among the books purchased, there should be mentioned "Climbing in the Himalayas," by Conway, the most remarkable alpine production of the times, and ranking in interest with the writings of Whymper. By the purchase of several volumes of the poetry of the mountains, and the donation of others, a nucleus for a poetical department has been formed.

From various sources, principally the United States Geological Survey, the maps have been increased by eighty-two accessions.

During the year a new book-case has been purchased, and placed in the Club-room; but with the growth of the library, and the bringing to the front of these volumes which were hidden behind the others, there is even now scant room on the shelves for future increase. When another book-case becomes necessary, the Room Committee may be obliged to wrestle with the problem whether the Club-members or the books shall occupy the room.

As in all libraries, the accessions of unbound volumes demand slightly more outlay than the available funds will provide for, and the excesses of several years are now on hand. The librarian trusts that, through private means, this balance may shortly be cared for, assuring the Club meanwhile that the Council is as liberal in its provisions as is consistent with the many demands made upon the financial resources of the Club. The librarian wishes to acknowledge, in addition to the gifts in books and pamphlets alluded to above, the receipt during the past year of generous donations in money from Mrs. J. H. Thorndike.

The detailed list of accessions is appended to this report.

Respectfully submitted,

JOHN RITCHIE, JR.,

Corresponding Secretary

ACCESSIONS TO THE LIBRARY FOR THE YEAR 1894.

FROM CORRESPONDING SOCIETIES.

American.

- Academy of Natural Sciences of Philadelphia.* — Proceedings, 1893, Part 3; 1894, Parts 1, 2.
- American Geographical Society.* — Bulletin, XXV. 4, Parts 1, 2; XXVI. 1-3.
- American Museum of Natural History.* — Annual Report, 1893; Bulletin, 1893, V.
- California Academy of Sciences.* — Proceedings, 2d ser. Vol. IV.
- Cambridge Entomological Society.* — *Psyche*, Vol. VII. 213-225.
- Essex Institute.* — Bulletin, Vol. XXV. 4-12; XXVI. 1-3; Sermon preached by Rev. E. B. Willson, Salem, on Henry Wheatland.
- Geological and Natural History Survey of Canada.* — Four plates to accompany Annual Report, V.
- Geological and Natural History Survey of Minnesota.* — Annual Report, XXI.; Bulletin, 10.
- Lick Observatory.* — Publications, Vol. II., III.
- National Geographic Society.* — Vol. V. pp. 97-263; VI. pp. 23-178; Plates 1-8.
- New Hampshire Historical Society.* — Proceedings, Vol. II. Parts 2, 3.
- Sierra Club.* — Bulletin, I.; 3, 4.
- Smithsonian Institution.* — Annual Report, 1891, 1892, 1893; Annual Report of the Bureau of Ethnology, V.-XII.; Bulletins Bureau of Ethnology, 1-19, 21.
- Torrey Botanical Club.* — Bulletin, XX. 12; XXI. 1-11.
- United States Department of Agriculture.* — Annual Summary of the New England Weather Service, 1893; Annual Summary of the Monthly Weather Review, XXI.; Bulletin New England Weather Service, 1894, 23-33; Monthly Weather Review, Oct.-Dec., 1893; Jan.-Aug., 1894; Report of Chief of Weather Bureau, 1891-92.
- United States Geological Survey.* — Annual Report, XII. 1, 2; XIII. 1-3 Bulletin, Nos. 97-117; Mineral Resources of the United States, 1892; Monographs, XIX., XXI., XXII.; 82 Atlas sheets.

Foreign.

- Club Alpin Belge.* — Bulletin, No. 19, 20.
- Club Alpin Français.* — (*Direction Centrale*) Annuaire XX.; Bulletin, 1893, 9; 1894, 1-11. (*Section des Alpes Maritimes*) Bulletin, XIV.; (*Section du Sud-Ouest*) Bulletin, XXXIV., XXXV.
- Club Alpino Italiano.* — (*Direzione Centrale*) Bollettino, XXVII. 60; Rivista Mensile, XII. 12; XIII. 1-11; (*Sezione Fiorentina*) Catalogo Generale della Biblioteca.
- Club Alpin Suisse.* — (*Comité Central*) Alpina, 2d Ann., 1-20; Jahrbuch,

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- 1893-94, XXIX., and Beilagen. (*Section G n roise*) *L' cho des Alpes*, 1893, 4; 1893, 1-3.
- Deutscher und  sterreichischer Alpenverein*. — (*Central-Ausschuss*) Mittheilungen, 1893, 23, 24; 1894, 1-19, 21, 22; *Zeitschrift*, XXIV., XXV. (*Section Frankfurt-am-Main*) *Festschrift zum 25-j hrigen Bestehen der Section Frankfurt am Main*.
- Kruimsk  Gornu  Klub*. — *Bulletin* No. 4.
- Magyarorszagi Karp t-egyes let*. — *Jahrbuch*, XXI.
- New Zealand Alpine Club*. — *Journal*, Vol. I. 4-6.
- Norske Turistforening*. — * rbog*, 1894.
-  sterreichischer Alpenclub*. — * sterreichische Alpen-Zeitung*, XV. 390; XVI. 391-415.
-  sterreichischer Touristen-Club*. — * sterreichische Touristen-Zeitung*, XIII. 24; XIV. 1-23.
- Siebenb rgischer Karp thenverein*. — *Jahrbuch*, XIV.
- Societ  Alpina Friulana*. — *In Alto*, V. 1-6; *Guida del Canal del Ferro*, by G. Marinelli.
- Societ  Alpina Meridionale*. — *Bollettino*, II. 1-4.
- Societ  degli Alpinisti Tridentini*. — *Della Storia Geologica del Lago di Garda*, by Torquato Taramelli.
- Soci t  des Touristes du Dauphin *. — *Annuaire*, No. 19.
- Svenska Turistf rening*. — * rskrift*, 1894.
- Geographische Gesellschaft* (Greifswald). — *Jahresbericht*, V.
- Gesellschaft f r Erdkunde* (Berlin). — *Verhandlungen*, XX. 10; XXI. 1-8.
- Imperatorskoye Russkoye Geographicheskoye Obshtchestvo*. — *Izvestiya*, XXIX. 5-7; XXX. 1-3; *Otchet*, 1893.
- Kais.-k nigliche Geographische Gesellschaft*. — *Mittheilungen*, N. F. XXVI.
- Nederlandsch Aardrijkskundig Genootschap*. — *Tijdschrift*, 2^e Ser. Deel. X. No. 8; XI. 1-7.
- Royal Geographical Society*. — *The Geographical Journal*, Vol. III. 1-6; IV. 1-6; *Proceedings of the Royal Geographical Society*, Vol. I. 1-12, 1879; II. 1-12, 1880.
- Sociedad Geografica* (Madrid). — *Boletin*, XXXV. 4-6; XXXVI. 1-4, 7-10.
- Sociedade de Geographia* (Lisbon). — *Boletim*, 12^a Ser. 3-12; 13^a Ser. 1-8.
- Societ  Geografica Italiana*. — *Bollettino*, VI. 10-12; VII. 1-10.
- Soci t  de G ographie* (Paris). — *Bulletin*, XIV. 3, 4; XV. 1, 2; *Comptes Rendus*, 1893, 17, 18; 1894, 1-16.
- Soci t  de G ographie Commerciale* (Bordeaux). — *Bulletin*, 1893, N^o 22-24; 1894, 1-22.
- Soci t  de G ographie Commerciale* (Paris). — *Bulletin*, XV. 4; XVI. 1, 2.
- Soci t  de G ographie* (Tours). — *Revue*, 11^{me} Ann. N^o 1.
- Soci t  Royale de G ographie d'Anvers*. — *Bulletin*, XVII. 5; XVIII. 1-4; XIX. 1, 2.
- Soci t  Kh diviale de G ographie*. — *Bulletin*, Ser. IV. Nos. 1, 2.

Teikoku Daigaku (Imperial University, Tokyo). — Calendar, 1893-94;
Journals of the College of Science, VI. 4; VII. 1; VIII. 1.
Verein für Erdkunde (Leipzig). — Mittheilungen, 1893.

OTHER EXCHANGES.

Tufts College. — Tufts College Studies, 1894, Nos. 1-3.
Around the World. — Vol. I. 1-7, 11, 12; II. 13.
Goldthwaite's Geographical Magazine. — Vol. V. 10-12; VI. 1.
Annalen des Kais.königlichen Naturhistorischen Hofmuseums. — Annalen,
VIII. 3, 4; IX. 1, 2.
Revue Géographique Internationale. — Vol. XVIII. 216, 218; XIX. 219-227.

DONATIONS.

Alpine Journal, Vol. XVII. 123-126. Gift of *Mrs. J. H. Thorndike*.¹
Outing, Vol. XXIII. 4-6; XXIV. 1-6; XXV. 1-3. Gift of *Mrs. J. H. Thorndike*.
Royal Scottish Geographical Magazine, Vol. IX. 12; X. 1-12. Gift of *Mrs. J. H. Thorndike*.
Goldthwaite's Geographical Magazine, Vol. III. 4, 5. Gift of *John Ritchie, Jr.*
Rivista Generale dei Club Alpini e delle Società Alpine. *R. H. Budden*. Gift of Author.
Travels amongst the Great Andes of the Equator. *Edward Whymper*. Gift of Author.
Supplementary Appendix to Travels amongst the Great Andes of the Equator. *Edward Whymper*. Gift of Author.
Scrambles amongst the Alps in the Year 1860-69. *Edward Whymper*. Gift of Author.
How to use the Aneroid Barometer. *Edward Whymper*. Gift of Author.
Notes on the Occurrence of Mammoth-Remains in the Yukon District of Canada and in Alaska. *Geo. M. Dawson*. Gift of Author.
Geological notes on some of the coasts and islands of Bering Sea and vicinity. *Geo. M. Dawson*. Gift of Author.
Second Expedition to Mount St. Elias. *I. C. Russell*. Gift of Author.
Alaska: Its Physical Geography. *I. C. Russell*. Gift of Author.
The Highest Meteorological Station in the World. *A. L. Rotch*. Gift of Author.
The Meteorological Stations on Mont Blanc. *A. L. Rotch*. Gift of Author.
Die Meteorologische Station auf dem Gipfel des Sonnblick. *A. von Obermayer and Julius Hann*. Gift of *Julius Hann*.
Jahres-Bericht des Sonnblick Vereins, I. II. Gift of *Julius Hann*.
Zur Meteorologie des Sonnblickgipfels. *Julius Hann*. Gift of Author.

¹ Names of Club members are in italics.

340 REPORT OF THE CORRESPONDING SECRETARY.

Einiges Resultate stündlicher meteorologischer Beobachtungen auf dem Gipfel des Fuji in Japan. *Julius Hann.* Gift of Author.

Die Neue Anemometer und Temperatur-Station auf dem Obirgipfel. *Julius Hann.* Gift of Author.

Beiträge zum täglichen Gange der meteorologischen Elemente in den höheren Luftschichten. *Julius Hann.* Gift of Author.

Die Neue Weltenwarte auf dem Obirgipfel. *Julius Hann.* Gift of Author.

Sitzung der mathematisch-naturwissenschaftlichen Classe vom 4 Jänner, 1894. *Julius Hann.* Gift of Author.

Annual Summary New England Weather Service, 1892. Gift of J. Warren Smith.

Geologische Nachlese. *Albert Heim.* Gift of Author.

Les Abîmes. *E. A. Martel.* Gift of Author.

Compte-Rendu Sommaire de la 5^{ème} Campagne Souterraine. *E. A. Martel* and *G. Gaupillat.* Gift of *E. A. Martel.*

Les Gorges et Ponts Naturels de l'Argens, etc. *Gabriel Gaupillat.* Gift of *E. A. Martel.*

Thirty other pamphlets by *E. A. Martel.*

California State Board of Forestry, Biennial Report, II., III. Gift of Sierra Club.

Forests of North America. *N. S. Shaler.* Gift of *Alexander Moore.*

The Migrations of Plants. *A. de Candolle, V. Hahn, etc.* Gift of *Alexander Moore.*

Inaccessible Valleys. *Alfred R. Wallace.* Gift of *Alexander Moore.*

Hégémonie de l'Europe. *Elisée Reclus.* Gift of Author.

Rivista mensile della Società Escursionisti e Pionieri della Pace, I. 1.

Charter, By-Laws, &c. of the Geographical Club of Philadelphia.

Bulletin of the Geographical Club of Philadelphia, Vol. I. 2.

Annals of the Astronomical Observatory of Harvard College, XL. 3; XLI. 1. Gift of the Observatory.

Verhandlungen des I. Congresses zur Hebung des Fremdenverkehrs in dem österreichischen Alpenländern.

Bollettino della Società d'Esplorazione Commerciale in Africa, IX. 6-7. Gift of Società.

Boletin del Instituto Geográfico Argentino, XV. 1-4. Gift of Instituto.

Proceedings and Transactions of the Nova Scotian Institute of Science, Series 2, Vol. I. 3. Gift of Instituto.

Annual Report of the Trustees of Public Reservations, 1893. III.

Proceedings of the Tacoma Academy of Science, 1893. Gift of Academy.

Where to go: How to get there. *T. W. Preston,* compiler. Gift of Publisher.

Road Book of Massachusetts. Gift of *Robt. A. Ware.*

Among the Hills and other Poems. *J. G. Whittier.* Gift of *T. T. Woodruff.*

Register of the A. M. C., 1894.

APPALACHIA, VII. 3.

PURCHASED.

Climbing and Exploration in the Karakoram-Himalayas. *Wm. Martin Conway.*
 Upon the Origin of Alpine and Italian Lakes: Glacial Erosion. *A. C. Ramsay, John Ball, etc.*
 The Mountains: a Collection of Poems.
 The Two Voices. Selected by John W. Chadwick.
 The White Mountains. *M. F. Sweetser.*
 Climbing in the British Isles: I. England. *W. P. Haskett Smith.*

 Treasurer's Report for 1894.

RECEIPTS.

Cash on hand, Jan. 1, 1894	\$225.08
Life-Memberships: Wm. H. Cades, C. P. Porter, Miss Juliet Porter, Mrs. L. G. Choate, Chas. N. Draper, Geo. T. Little, Mrs. E. P. Underhill—7 at \$30	210.00
Admission fees:	
From 128 new members at \$5	\$640.00
Assessments:	
From 3 members for 1893.	
" 656 " " 1894.	
" 4 " " 1895.	
663 members at \$3	1,989.00
Interest:	
On Permanent Fund, additional for 1891	\$4.00
On Treasurer's Bank account, &c.	17.65
	21.65
Donations:	
From Mrs. J. H. Thorndike, for Library	\$10.00
From members, for flag and sign on Bear Hill	12.25
	22.25
APPALACHIA and other Publications:	
From sales of APPALACHIA	\$40.79
" " maps	165.11
	205.90
Department of Art:	
From sale of Sella Catalogues in Philadelphia, Washington, New York, Brooklyn, and Bridgeport	201.40
Amounts carried forward	\$3,080.20
	<u>\$435.08</u>

<i>Amounts brought forward</i>	\$3,080.20	\$435.08
Field Meetings and Excursions:		
From Excursion Committee	14.04	
Total Income		<u>3,094.24</u>
		<u><u>\$3,529.32</u></u>

PAYMENTS.

To Trustees of the Permanent Fund,		
For 7 Life-Memberships	\$210.00	
Interest, additional for 1891	4.00	
		<u>\$214.00</u>
Postage and stationery	\$176.49	
Printing and advertising	\$118.25	
For Club Register for 1894	103.75	
		<u>222.00</u>
Clerical services	236.80	
Expenses of meetings	177.64	
Annual Reception	16.50	
Library :		
For books	\$17.83	
For binding	72.33	
		<u>89.66</u>
Room, at No. 9 Park Street :		
For rent	\$448.00	
For care	42.00	
For gas	2.50	
For bookcase	30.00	
For sundries	17.78	
		<u>540.28</u>
APPALACHIA, and other Publications:		
For Vol. VII. No. 3	\$417.14	
For delivery of the same	62.50	
For sundries	50.00	
For Guide-Book for Greater Boston in part	250.00	
		<u>779.64</u>
Department of Improvements :		
For work on paths on N. H. mountains .	\$144.61	
For repairs and supplies at Madison Spring Club Hut	70.39	
For flag and sign on Bear Hill Observatory	13.75	
		<u>228.75</u>
Department of Art:		
For catalogues for Sella Exhibitions . .	\$167.95	
For photographs	18.48	
		<u>186.43</u>
<i>Amounts carried forward</i>	\$2,654.19	<u>\$214.00</u>

TREASURER'S REPORT.

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<i>Amounts brought forward</i>	\$2,654.19	\$214.00
Department of Natural History:		
For meteorological instruments	\$16.00	
For boxes and labels for botanical specimens	40.00	
	<u>53.00</u>	
Donations:		
To Trustees of Public Reservations	25.00	
	<u>2,735.19</u>	
Total expenses		\$2,949.19
Balance, Club Funds	\$526.18	
New Hampshire Forest Fund	54.00	
	<u>580.18</u>	
		<u>\$3,529.32</u>

Respectfully submitted,

JOHN E. ALDEN,
Treasurer.

Boston, Jan. 9, 1895.

Boston, Jan. 4, 1895.

The undersigned have examined the accounts of the Treasurer of the Appalachian Mountain Club, for the year 1894, and believe them to be correct. We found proper vouchers for all payments, and have verified the cash on hand, amounting to \$580.18.

ISAAC Y. CHUBBUCK,
CHARLES H. FRENCH,
CHARLES W. KENNARD, } *Auditors.*

RECEIPTS FOR FIRST NINETEEN YEARS.

Year.	MEMBERSHIP.					Life Membership.	Sales of APPALACHIA and other publications.	Interest.	Annual Reception.	Field Meetings and Excursions.	Donations.	Total.
	Admission Fee.	Yearly Assessments.	Back Assessments.	Advance Assessments.	Total.							
1876	252.00	....	....	....	252.00	....	43.18	....	....	....	....	295.18
1877	50.00	254.00	8.00	....	312.00	....	98.00	....	....	....	....	410.00
1878	54.00	294.00	....	....	348.00	60.00	75.70	....	....	....	43.00	496.70
1879	148.00	255.00	40.00	4.00	447.00	....	120.85	1.90	....	....	221.70	802.45
1880	178.00	832.00	24.00	4.00	538.00	90.00	116.90	10.79	....	....	86.21	841.90
1881	222.00	894.00	15.00	12.00	636.00	120.00	141.40	17.59	....	....	62.55	977.54
1882	253.00	528.00	74.00	....	855.00	90.00	809.43	22.07	....	....	2.00	1281.50
1883	335.00	1000.00	20.00	27.00	1442.00	210.00	197.58	39.72	9.73	82.88	22.00	2703.90
1884	285.00	1059.00	21.00	9.00	1374.00	60.00	93.51	53.29	26.80	11.47	1.00	1620.07
1885	375.00	1212.00	89.00	12.00	1668.00	60.00	112.19	61.09	.45	70.73	594.50	2507.96
1886	426.00	1317.00	90.00	24.00	1857.00	380.00	247.94	88.02	12.50	124.25	364.20	3024.61
1887	385.00	1491.00	90.00	42.00	2008.00	180.00	163.80	79.34	10.00	40.20	114.00	2615.34
1888	355.00	1589.00	117.00	12.00	2020.00	180.00	67.06	42.52	9.30	45.94	754.76	3119.45
1889	655.00	1617.00	69.00	27.00	2368.00	120.00	98.85	151.29	11.48	....	127.63	2872.22
1890	450.00	1620.00	24.00	15.00	2109.00	150.00	1168.12	217.12	3.73	....	120.85	3868.53
1891	500.00	1743.00	12.00	9.00	2264.00	120.00	354.28	182.54	....	145.27	30.00	3087.09
1892	560.00	1830.00	15.00	9.00	2414.00	300.00	625.22	130.29	....	70.53	.50	3540.59
1893	490.00	1908.00	6.00	....	2394.00	300.00	20.97	431.90	....	12.57	454.50	3914.94
1894	640.00	1968.00	9.00	12.00	2629.00	210.00	407.30	21.65	....	14.04	22.25	3304.24
Total	6666.00	20619.00	706.00	218.00	27909.00	2580.00	4483.24	1551.72	82.88	620.06	3061.62	40284.69

1 Including \$3.00 for keys.

EXPENDITURES FOR FIRST NINETEEN YEARS.

Year.	Permanent Fund.	Reserve Fund.	Stationery, Postage, and Printing.	APPALACHIA and other Publications.	Department of Topography.	Improvements and Explorations.	Natural History and Art.	Clerical Expenses.	Expenses of Meetings.	Library.	Club Room.	Donations.	Total.
1876	....	....	109.91	140.86	....	15.00	....	....	....	....	....	....	265.77
1877	....	....	60.65	394.18	....	....	13.45	....	....	....	....	....	428.23
1878	....	....	202.31	169.80	2.00	20.00	52.48	....	....	....	....	....	446.59
1879	60.00	....	162.31	847.92	19.20	158.78	....	....	....	....	....	....	1748.19
1880	90.00	....	186.17	818.18	19.00	72.60	....	....	....	....	....	....	885.90
1881	120.00	....	894.09	246.23	87.96	68.00	....	19.75	....	....	....	....	1008.72
1882	90.00	....	258.99	675.98	25.40	....	....	84.50	25.00	....	....	....	1109.89
1883	281.72	....	399.73	396.27	23.65	160.37	....	67.41	1.38	69.78	....	....	1360.31
1884	113.42	....	382.49	1176.53	....	21.00	....	57.62	....	58.10	....	....	1809.16
1885	86.48	....	363.27	861.31	229.00	102.00	....	106.00	58.08	72.50	284.17	25.00	1692.79
1886	270.00	....	432.38	932.91	77.73	46.00	74.00	121.45	171.15	131.72	967.30	49.98	2974.62
1887	388.38	1000.00	289.38	166.71	538.97	123.02	20.12	107.12	145.45	102.50	504.81	....	3786.45
1888	290.00	100.00	473.95	597.59	....	779.55	8.32	49.50	93.45	120.56	456.12	....	2669.04
1889	220.00	114.70	390.77	1127.91	7.20	118.58	86.76	128.75	68.86	67.33	487.34	....	2813.20
1890	253.48	48.59	463.43	1692.95	....	46.07	101.56	181.00	58.35	96.06	464.26	....	3426.44
1891	305.64	605.71	389.27	833.17	50.00	123.00	45.96	191.50	121.60	117.10	471.69	105.30	3359.34
1892	399.56	200.00	438.72	1059.89	216.33	46.60	122.39	197.50	138.96	118.45	534.08	61.34	3619.31
1893	415.27	74.97	446.07	1066.18	....	694.15	664.45	221.95	208.70	59.10	576.04	25.00	4466.88
1894	214.00	....	338.49	947.50	....	228.75	74.48	236.80	194.14	89.96	640.28	25.00	2949.19
Total	3617.96	2143.97	6223.38	13002.01	1246.43	2813.45	1263.37	1715.85	1292.79	1097.96	4966.78	291.62	39704.36

Report of the Trustees of the Permanent and Reserve Funds for 1894.

PERMANENT FUND. — PRINCIPAL.

1894.

January 10.	Amount on deposit in Suffolk Savings Bank	\$1,428.10	
	Amount on deposit in Provident Institution for Savings	1,103.34	
	Amount on deposit in Lexington Savings Bank	872.51	
	Total on hand Jan. 10, 1894, as per last account . . .	\$3,403.95	
Amounts received from J. E. Alden, Treasurer, for			
Life-Memberships during the year :			
March 24.	Charles P. Porter	\$30.00	
" "	Miss Juliet Porter	30.00	
" "	William H. Cades	30.00	
May 28.	Mrs. L. G. Choate	30.00	
October 9.	Charles N. Draper	30.00	
November 17.	George T. Little	30.00	
December 7.	Mrs. Eliza P. Underhill	30.00	
			210.00
	Total Principal on hand Jan. 9, 1895	\$3,613.95	

PERMANENT FUND. — INTEREST.

Interest on deposit in Suffolk Savings Bank for six months, to April, 1894, at 4%	\$28.56
Interest on same for six months to Oct. 1894, at 4%	29.12
Interest on deposit in Provident Institution for Savings for six months to January, 1894, at 4%	22.06
Interest on same for six months to July, 1894, at 3%	16.87
Interest on deposit in Lexington Savings Bank for six months to April, 1894, at 5%	21.08
Interest on same for six months to October, 1894, at 4%	19.96
Total Interest on Permanent Fund received for the year, and paid to the Treasurer of the Club according to vote of the Council, Dec. 11, 1894	\$137.65

RESERVE FUND. — PRINCIPAL.

1894.

January 10.	Amount on hand as per last account, loaned to Massachusetts Loan and Trust Co.	\$1,366.37
	On deposit in Five Cents Savings Bank	777.60
	Total principal on hand Jan. 9, 1895	<u>\$2,143.97</u>

RESERVE FUND. — INTEREST.

Interest on deposit in Five Cents Savings Bank for six months to April, 1894, at 4%	\$15.54
Interest on same for six months to October, 1894, at 4%	15.86
Interest on Loan to Massachusetts Loan and Trust Co., for six months, to July 1, 1894, at 4%	27.33
Interest on same for six months to Jan. 1, 1895, at 3%	20.49
Total Interest on Reserve Fund re- ceived for the year, and subject to action of the Club	<u>79.22</u>

The amounts in the hands of the Trustees are now
as follows:

Permanent Fund	\$3,613.95
Reserve Fund	2,223.19
Total amount in the hands of the Trustees	<u>\$5,837.14</u>

The Trustees respectfully suggest to the Club the desirability of having the accounts of the Trustees of the Permanent and Reserved Funds audited.

The financial depression of the last two years has not unnaturally caused some of the Institutions holding our funds to reduce slightly their rates of interest, as shown in the figures above. As this was, however, only a matter of conservative management on the part of safe corporations, the Trustees have decided not to make any changes of investment at present.

REST F. CURTIS,	} Trustees.
CHARLES H. FRENCH,	
ISAAC Y. CHUBBUCK,	

Boston, Jan. 9, 1895.

Report of the Trustees of Real Estate.

To the President and Members of the Appalachian Mountain Club:—

IN making our first annual report, your Trustees regret that it is not possible for them to give anything of much value, though this condition does not exist because of any lack of interest or work on our part, but because in the beginning of a new enterprise, and especially one of such magnitude as that with which we have been charged, it is essential that any action shall be preceded by most careful inquiry, and taken only after much consideration. The months in which we have been in office have been occupied mostly in the securing of this information, qualifying us now for action; and such matters as we have entered upon are not at present in such a condition that we can make any definite report. Under these circumstances, we trust that this may be considered a compliance with the requirement of the Constitution, and that we may be permitted later, if found possible and expedient, to make another and more extended communication.

HARVEY N. SHEPARD,	} Trustees of Real Estate.
J. RAYNER EDMANDS,	
A. E. SCOTT,	
CHARLES E. FAY,	
A. L. GOODRICH,	

Boston, Jan. 9, 1895.

Reports of the Councillors for the Autumn of 1894.

Natural History.

BY WILLIAM H. NILES.

THE Councillor has the pleasure of reporting that Miss Helen M. Hitchings has given to the Club the valuable Herbarium of American Ferns of the late E. H. Hitchings. It consists of three hundred sheets, representing one hundred

and forty-six species. The specimens are in good condition, and the attention which they have required since they have been received by the Club has been given by Miss Batchelder.

The members of the Room Committee, consisting of Miss Isabel Batchelder, Miss Agnes W. Lincoln, and Miss Lucy A. Putnam, have done excellent work in the care of the specimens belonging to the Club. Under Miss Putnam's direction, nineteen tin boxes have been made so as to fit accurately into one of the cases. These boxes were very carefully planned and nicely constructed, so that the protection which they give to the plants is exceedingly satisfactory. Miss Lincoln has very kindly done work upon the specimens in arranging them and putting them in good condition, and Miss Batchelder has rendered valuable services.

Reports of the Councillors for the Autumn of 1894.

Art.

BY LUCY A. PUTNAM.

THE Councillor of Art has to report comparatively few additions to the photographic collection of the Club during the past year; not, perhaps, because there has been less activity than usual among our members interested in photography, but probably by reason of delays in getting out their work. Several sets have been promised, and will doubtless soon be forthcoming. One series of especial attractiveness, but which it has been found impossible up to this time to identify — obviously rural American scenery — was left at the room with no hint of the name of the donor, whom the Councillor would gladly take occasion here to thank for the gift.

One labor of a certain value has been accomplished during the year, which the Room Committee at least will appreciate, — the disposition of the loose photographs that for some years have been collecting in the drawer of the map-case and elsewhere about the Club-room. These have been classified and

arranged, the smaller ones in a box with different-sized compartments made for the purpose, the larger in two receptacles (15" $\times$ 20" $\times$ 4"),—one for views of New England, the other for other localities. Persons desiring to consult the Club's collection of miscellaneous photographs will find their task much facilitated.

The report of the Committee on the Sella Collection, which is appended to this report, will show that during the year just closing the Club has accomplished a good work in other cities in the way of stimulating popular interest in natural scenery through the photographic art.

REPORT OF THE COMMITTEE ON THE SELLA COLLECTION.

THE Committee on the Sella Collection has to report a year of very satisfactory results in their efforts to carry out one of the chief objects in view when these superb photographs were purchased; namely, to have them enjoyed by the largest possible number of persons in various parts of the United States.

Immediately after its appointment, the Committee entered into correspondence with several organizations in cities between Washington, D. C., and Boston, which led to immediate arrangements for exhibitions under their auspices. The first of these was held in Washington under the joint direction of the National Geographic Society and the Cosmos Club, in the hall of the latter society. While not notably successful in point of numbers attending, the appreciation was most gratifying. To quote from President Gilbert of the Cosmos Club: "Several geologists, topographers, and artists studied the views with profit." As one direct result, the United States Geological Survey made a special appropriation to secure duplicates of a large number of the views; and a few weeks since the Collection was sent again to Washington, at the request of the Director of the Survey, in order to give opportunity for a selection of the same.

From that city the pictures were forwarded to Philadelphia, where they were exhibited from April 11 to 27 in the Academy of the Fine Arts, under the auspices of the Geographical Club. Here again, while the number of visitors was less than was anticipated, the amount of pleasure given was correspondingly large.

The Geographical department of the Brooklyn Institute of Arts

and Sciences, reciprocating our Club's interest in their geographical exhibit in 1891, was the next to receive them. The Collection was finely displayed in the large hall of the Art Association, day and evening, from May 1 to 8. The exhibition had been widely advertised, and with most satisfactory results. A member of the committee in charge says: "The attendance (2,462) was considerably above that of most of our exhibits of late. . . . The Brooklyn teachers turned out in large numbers. Everybody is sorry that we could not have had it another week; for the pictures were simply advertising themselves in the week we showed them." A member of our own Committee visited the exhibition in Brooklyn, and was forcibly reminded — among other things, by the genial presence of members of the Appalachian Mountain Club residing in that vicinity — of the pleasant gatherings at the Art Club during the Boston exhibition.

From Brooklyn the Collection was transferred to New York, to the care of the American Geographical Society, and was exhibited by this body, jointly with the American Museum of Natural History, in the halls of the latter society, from May 14 to June 4. Several thousand tickets were issued by the two associations, and the press gave very full notices of the Collection. To quote again: "They have proved a distinct attraction during the week that closed last night, and we are finding, as in Brooklyn, that they are their own best advertisement. The attendance has been about 300 a day up to yesterday, when it must have been 700 to 800." And yet "an unusual number of rainy days interfered very much with the attendance."

During the summer the Collection was stored with the Art Department of the Public Library of Bridgeport, Connecticut, and was exhibited under these auspices from September 8 to October 27. This was the longest period that it was anywhere shown, but the interest seemed to continue to the end. It was here, in fact, that the most complete popular success was attained, the attendance far surpassing that which so gratified us in the Boston exhibition, when 9,000 visitors were recorded. At Bridgeport 20,000 was the record, visitors coming in from the whole surrounding country. Although shown in a hall of ample size, the space was sometimes inadequate to the throng; and on the day when the resort was the largest the stairways were blocked, and persons had to await their turn to be admitted.

The New Haven Camera Club, some of whose members had seen the Collection in other places, was the next to request its loan, and

it was exhibited in that city during December, after which it was returned to Boston.

Before shipment to Washington for inspection by the Geological Survey, as stated above, the pictures were individually examined by a member of the Sella Committee, with an extremely satisfactory result. Only three were found to have been lost since the original receipt of the Collection in Boston, and in general, thanks to the carefulness of those who have handled them in the mean time, they have suffered very little detriment; indeed, all the damage seems to be confined to the corners of the "mounts," where tacks have been inserted in hanging, the pictures themselves being almost as fresh and perfect as when first opened by us in May, 1893. It is a testimony to the great care with which the prints were made that very few have faded in the least. The losses have already been made good by Signor Sella, to whom also the Club is indebted for several additional pictures, chiefly panoramas from his Caucasian negatives. He also promises a continuance of his interest in the Collection.

The sale of catalogues has not met the expectation of the Committee. The desire to know just what one is looking at and enjoying seems to be an acquired taste. At the first exhibition the ratio of sales of catalogues to visitors was 1 : 9. This ratio seems to have been exceedingly high; in no place has it been approached; in one instance it has been as small as 1 : 200. Nevertheless there has been a slight profit to the department of Art from this source. Of 2500 catalogues printed some 1500 have been sold with a net gain of \$33.65, leaving nearly 1000 copies on hand, upon which all that is realized in future exhibits will be net.

The Committee is desirous and hopeful of arranging for exhibitions in the Central and Western States. Negotiations are pending, also, for one in San Francisco under the auspices of the Sierra Club. It is hoped that arrangements may yet be made for an exhibit in Chicago, though efforts in this direction have thus far been unsuccessful.

It is hardly to be anticipated that so great a success will attend any future year as has signalized the one just past, by reason of the lack of societies interested in furnishing to the public instruction and pleasure of this character, and on account of the difficulty of coming into relations with such as may exist. If, therefore, any to whose notice this report shall come should know of societies — geographical clubs, natural history societies, camera clubs — so

situated as to secure the requisite facilities, that would be willing to take charge of such an exhibition, the Committee would be grateful for suggestions, and particularly so if steps should be taken that would lead such societies to make application for the loan of the Collection.

CHARLES E. FAY,	}	<i>Committee of the Sella Collection.</i>
ELIZABETH H. DENIO,		
FRANK W. FREEBORN,		
LUCY A. PUTNAM,		

Reports of the Councillors for the Autumn of 1894.

Improvements.

BY RICHARD B. GROVER.

I AM happy to report that the work accomplished by the Department during the past year has been considerable, — not quite what your Councillor anticipated at the opening of the season, yet on the whole quite as much perhaps as one in his profession might be expected to carry out.

In the line of paths, very little new work was undertaken beyond what had been planned for the preceding year. A preliminary survey was made for a new path, *via* the Gordon Ridge to Mt. Madison and the Club Hut. This route was found to be in many ways a very practical one, — one which could be easily constructed; and, when built, it would probably be the easiest route to the summit, the gradients being very much less than by any of the other routes. The distances were not measured. To all desiring to ascend either to the summit of Madison or to the Club Hut, from the Glen Road Station on the Concord and Montreal Railroad, this route would be far preferable to any other.

And just here I may say that the Madison Spring Hut was thoroughly overhauled at the opening of the season. The stove was supplied with a new pipe. A new set of kitchen utensils of enamel ware was furnished, also many articles for the table, in addition to knives, forks, and spoons. Six

pairs of all-wool blankets were also provided. The outlay for these articles was considerable; but the large use now made of the Hut seemed to warrant it, one hundred and eighty-eight names having been registered during the year. The new sanitary arrangements were completed early in the season.

The camp in Carter Notch, injured during the preceding winter, was repaired and covered with "Neponset" paper; and from the pleasant words which have reached your Councillor, he judges that a generous use has been made of it.

All the Club paths on the north side of the Great Range have been carefully cleared and put in as good condition as circumstances would seem to allow. The "Air-Line" path, in many of its parts, is in very poor condition, owing to the use which the sportive waters make of it in the spring of the year, and at the time of heavy rains. The path to the Ice-Gulch has also been cleared and improved. In this connection I would recommend that the path to the Pond of Safety, partially opened by Mr. E. B. Cook the past season, be accepted and put in order. The route, as located by Mr. Cook, presents an opportunity for a delightful tramp, and in addition gives the only view of Mt. Washington to be obtained on the Crescent Range.

The Glen House side of the Carter Notch path has been re-located, the entrance being indicated by a guide-board upon a telegraph pole on the Gorham road near the bridge over the Nineteen-Mile Brook. It is perhaps two hundred feet south of the lumber-camp known as "Cow-boys' Home." The path follows the right bank of the brook to a second lumber camp, and just above crosses to the left bank, following it to a guide-board on a large tree just where an old logging-road crosses the brook, and then makes directly for the summit of the col, about one half mile distant. Should the Glen House be rebuilt, and the lumber operations allow, it might be advisable to again re-locate this path, keeping it high up on the eastern face of Wildcat to the col between Wildcat and Little Wildcat, and then gradually descending the western face of the latter to the Glen House. Such a

route would seem to be the shortest, and would present no very steep climbing.

Owing to the lumber operations in the Little River region, nothing was done upon the Twin Mountain path beyond opening a trail through the intricate network of wood roads to the original path, half-way up the mountain. And I would advise suspension of work on this path for the present, and until the lumber operations in that particular locality cease, which no doubt will be in a year or two. The record roll in the cylinder on the North Twin at the time of my visit did not show a single recorded ascent during the preceding twelve months.

Crossing now to the south side of the mountains, the path to Mt. Willey was put in order in July, as also that to Mt. Carrigain. The Livermore-Waterville path and the Black Mountain Path were cared for again this year, as last, by the Waterville Athletic Association, the expense being paid by the Club.

In July new record cylinders were placed by the Councillor on Carter Dome and Mt. Adams, the latter taking the place of the one partially destroyed by lightning while in the hands of one of the members of the Gorham party of June 18.

I would recommend the adoption by the Club of the Mt. Passaconaway path, as the original constructors of the same have signified their willingness to have it pass into the control of the Club. I would further urge the recommendation of last year, namely, that a simple shelter for men be erected in the col between Mts. Jefferson and Adams.

In closing, I desire to express my hearty thanks to those members of the Club who have kindly co-operated with the Councillor the past year, and to Mr. J. Rayner Edmands and Professor Fay in particular, for much valuable assistance.

Report of the Excursion Committee for 1894.

THE Excursion Committee for 1894 are able to report that this year, like its predecessors, has been one of unabated interest in the out-door life of the Club. There have been during the year nine excursions, including one snow-shoe excursion, and thirty-three outings. Twelve more outings were planned, but were given up on account of stormy weather; on three of these, however, some members of the Club went out notwithstanding the unfavorable conditions.

The Snow-Shoe Excursion was held at JACKSON, N. H., from February 17th to 28th. Forty-four members and friends took part, staying at the Eagle Mountain House, where they were well served and comfortably lodged by Mr. Gale. Trips were made to Double-Head, the Carter Notch, Mt. Sable, Mt. Willard, Black Mountain, and Thorn Mountain, and to a logging-camp at the foot of Mt. Wild-Cat. Two of the party on the Carter Notch excursion went over into the Pinkham Notch, and attempted the ascent of Mt. Washington, going as far as the Half-Way House. One of them subsequently made the ascent from the Fabyan House, accompanied by the man in charge of the railroad station at the base of the mountain. The excursion to Mt. Willard on February 22d was particularly satisfactory. The day was brilliantly clear, and the appearance of the mountains covered with snow was in marked contrast with their familiar aspect in summer. The view of the summit of Mt. Washington as seen through the valley of the Mt. Washington River on the return by railroad through the Notch, snow-covered and tinged with the rosy light of sunset, made a picture never to be forgotten.

By an Act of the Legislature of 1894, Fast Day was abolished, and the 19th of April was made a legal holiday. On this day an all-day walk over the BLUE HILL RANGE from West Quincy to Readville was taken, under the leadership of Messrs. John E. Alden, George C. Mann, and J. Allen Crosby. The walk was interesting as dedicatory both of the Blue Hill Reservation and of the new State Holiday. The day was a fine one, and members and friends to the number of seventy-four took part in the walk.

The regular April walk was taken on April 28th, under the leadership of Messrs. James R. Carret and C. Fred Howe, to KINGSTON and Monks Hill. The day was a fine one, but not clear enough to render the end of Cape Cod visible from the top of the hill. Thirty-eight members and friends went. Lunch was taken by the shore of Smelt Pond, and an abundance of mayflowers were found by the party on their return.

The May Walk, on the 12th, was from HAMILTON to West Manchester. The party numbered seventy-one, under the leadership of James R. Carret and J. Allen Crosby. Leaving the train at Hamilton Station, which is near the foot of Brown's Hill, the party ascended the hill, which gives widely extended views of Northeastern Massachusetts. Descending, they took the route past Chebacco Lake, a beautiful sheet of water in Hamilton and Essex, and through the woods to West Manchester station, finding especially interesting a ravine where the boulders and ledges are covered with a growth of winter ferns.

A Memorial Day Excursion, May 26th to 31st, was made to GREENFIELD, N. H., by twenty-two members and friends, under the charge of Mr. Carret, the party having accommodations at the Hotel Mayfield. Monday, May 28th, was devoted to Pack Monadnock, a large part of the party making the ascent of both peaks, which are known locally as South Mountain (the northern peak) and Mt. Miller (the southern peak). A heavy rain-storm during the night of Monday and the early morning of Tuesday threatened to prevent any excursion on that day; but the clouds breaking away, one was made in the afternoon to Lyndeboro Pinnacle. Wednesday, the 30th, was devoted to an excursion to CROTCHET MOUNTAIN in Franconia. The region is an interesting one, and the Club will find it well worth revisiting on some other occasion.

Fifty-one members of the Club and their friends participated in an excursion to RUTLAND, Mass., June 15th to 18th. The party, some thirty in number, reached Rutland after a drive through the interesting country in the vicinity, visiting the central tree of the State, Muschopauge Lake, and other places. On Saturday about thirty enjoyed a long ride across the country to Asnebumskit, and on Monday large parties visited Barre Falls and the New Boston Elm. The weather during the trip was hot and hazy, and at no time did it seem advisable to make up a party for the summit of Wachusett. This excursion was under the charge of Mr. John Ritchie, Jr.

The twenty-ninth Field Meeting of the Club — the second on the SUMMIT OF MT. WASHINGTON — was held during the first week of July. An advance party of five left Boston on Friday, spending the night at the Fabyan House, and walking up the Crawford Path on Saturday, June 30th; the main party on Saturday morning *via* the Concord and Montreal Railroad, arriving at the summit by train in the early evening. Arrivals and departures took place on every day of the week, but the number present Monday night was ninety-nine; the total one hundred and seven. Sunday was spent by a portion of the company in longer or shorter walks, thirty-two visiting Boott's Spur, fifteen Bigelow's Lawn (eleven of them climbing Mt. Munroe), and twenty-seven the Alpine Garden. Monday was a fine but warm day, and fifty took the trip to

Tuckerman's Ravine, where the Snow Arch was in good condition, notwithstanding the fall of a portion of it in the presence of some of the party. All but four continued to Hermit Lake, fifteen returning by the Raymond Path, three going up through Huntington's Ravine, and four visiting Glen Ellis Falls. In the evening a session was held, at which Professor C. H. Hitchcock discoursed upon "The Glacial Geology of Mt. Washington and the Neighboring Peaks;" and Mr. S. H. Scudder spoke of "The Effect of the Glacial Epoch on the Insect and Plant Life of the Mountains." A paper of Mr. J. Rayner Edmonds on "Paths over the Northern Summits" was read. On Tuesday, in spite of a severe rain-storm, a party of fifteen went over the Northern range to the Madison Spring Hut, nine of them remaining over night. Three others made the descent into the Great Gulf. Wednesday, July 4th, was ushered in by a brilliant sky, and a six o'clock breakfast, every plate decorated with a flag. Fifty-three boarded the cars for the Gulf station and Mt. Jefferson. Forty-two lunched at Spaulding's Spring, and twenty-three kept on to Mt. Adams. Eight spent the night at the Madison Spring Hut, the party of the previous night transferring themselves to the Cascade Camp for a second night's camping. On Thursday both camping-parties returned. The weather was cloudy, with some rain. Small parties took walks upon the carriage-road, into the Great Gulf, and elsewhere. In the evening a second session was held, at which Professor Hitchcock and Mr. Scudder again spoke. Mr. Harvey N. Shepard made remarks upon forestry, and Mr. T. O. Fuller and others exhibited and discussed botanical specimens which they had collected. On Friday small parties visited Tuckerman's Ravine (nine), Mt. Munroe (eleven), the Alpine Garden (sixteen), Mt. Pleasant (seventeen). Several of the latter went on to the Crawford House, where they were followed on Saturday by a dozen more. A few went out by the way of the Madison Spring Hut. The party on the summit broke up on Saturday, but many remained at the Crawford House over Sunday, and only a dozen returned directly to Boston *via* North Conway. The weather during the week was on the whole good; the accommodations and attention at the Summit House were excellent; the uniform courtesy and attention of the officers of the Concord and Montreal Railroad contributed greatly, as on previous excursions, to the enjoyment of the party, and the programme and excursions were successfully carried out.

Two successful HARBOR EXCURSIONS were made under the leadership of Captain Palmer, — the first on June 23d, an all-day excursion, visiting various points of interest in the harbor, attended by ninety-five; and the second, for about half a day, on which seventy-three went, on July 28th, to Marblehead.

A camping-party, under the charge of Messrs. James R. Carret and Parker B. Field, spent two weeks — August 3d to 17th — in camp near

"McCrillis's" in the edge of the WHITEFACE INTERVALE at North Sandwich, N. H., at the foot of Mt. Whiteface. Twenty-five members were present, and the party found the region interesting and attractive. Ascents were made of Black Mountain, sometimes called Sandwich Dome, Whiteface, Passaconaway, and Chocorna. Part of the party which ascended Black Mountain went on to "Greeley's" in the Waterville Valley, and returned to camp the next day. Rides were taken to Squam Lake, Bear Camp Pond, and Chocorna Lake. The party which ascended Passaconaway spent the night at the Club camp, and those who went to Chocorna stayed over night at the hotel on the mountain near the foot of the cone.

The Autumn Excursion to WILLOUGHBY LAKE, VERMONT, from September 28th to October 6th, was attended by forty-six members and friends, under the leadership of Mr. Walter R. Davis. The party went by rail to West Burke, Vt., and there took carriages for Willoughby Lake House. On the morning of the 29th a party walked up Mt. Annanance, and in the afternoon a steamer-ride was taken around the lake. On the 30th the steamer was taken to the east side of the Lake, and the party ascended Bear Mountain. October 1st a stage conveyed twenty-one members to Bald Mountain; ten of the number climbed the mountain and walked back to the hotel. The following day a second party went up Mt. Annanance. On the 3d walks were taken through the woods and through "Green Tunnel." On the 4th a party drove to Newport, Vt., on Lake Memphremagog, and on the 5th took a steamer-trip on Lake Memphremagog, stopping at the Owl's Head House and at Georgeville, where lunch was taken. On October 6th, all but eight of the party returned to Boston.

An all-day outing was taken Saturday, October 20th, under the charge of Rev. E. F. Merriam, by a party of twenty-six to WALPOLE and FOXBORO, visiting various places of historic interest, — the old post-road between Boston and New York, the site of an Indian encampment, and that of an old forge where cannon were first cast in America.

The all-day outings, eight in number, some of which have been already mentioned, are as follows: February 22d, Lynn Woods; April 7th, North Scituate and The Glades; May 30th, Canton; June 2d, Middlesex Falls, Bear Hill (part of the party for all day); June 18th, Gloucester; June 23d, Harbor Excursion; October 20th, Walpole and Foxboro; December 1st, Lynnfield and the Peabody Boulders (in place of Election Day Walk, given up on account of storm).

The number of members and friends on the thirty-three regular outings was twelve hundred and fourteen, on three outings given up on account of a storm, where some members went notwithstanding, twenty-three; and on nine excursions, four hundred and seventy-eight, — making a total of seventeen hundred and fifteen. The average on the outings was thirty-seven, and on the excursions fifty-three.

Thirty-two members of the Club have served as leaders or on committees in charge of outings or excursions; of these two have served on ten occasions, two on five, one on four, four on three, three on two, and twenty on one. From this it is clear that the bulk of the work is done by comparatively few persons; and it is hoped that the interest in this department will be further evidenced by a willingness to serve the Club in preparing and taking charge of outings and excursions on the part of others than those who have so cheerfully given their services in the past.

The financial report of the Treasurer of the Committee shows a balance in cash of \$115.42. This includes \$50 advanced to the Committee by vote of the Council in March last. Of this balance \$64.04 have been turned over to the Treasurer of the Club; and the remainder, \$51.38, is retained by the Treasurer of the Committee to be used until the appointment of the new Excursion Committee, and then to be turned over to the Treasurer of that Committee. There are also assets on hand in the shape of railroad tickets on the various roads out of Boston to the value of \$78.

The Committee have had six meetings for arranging the year's work. In these they have greatly missed the kindly interest and the helpful experience of their colleague, Mr. Hardwick. His large knowledge and wise advice regarding places suitable for excursions and the management of parties have been of substantial assistance to the Club for some years, and we desire to record our sincere appreciation of these qualities in one who was taken from us while still in their exercise.

For the first time an excursion has been suggested of such an extent, in time and distance, that it has seemed desirable for the Excursion Committee of one year to bring it to the attention of the Club for the following year. A possible excursion to the Selkirk Mountains of British Columbia for August, 1895, has been proposed, and is now under discussion.

REST F. CURTIS,	} Committee on Field Meetings and Excursions.
WALTER B. ABBOTT,	
JAMES R. CARRET,	
PARKER B. FIELD,	
CHARLES C. HALL,	
GEORGE C. MANN,	

Proceedings of the Club.

March 7, 1894. — One Hundred and Forty-fifth Corporate Meeting.

President Moxom in the chair.

Ninety-five persons were present. Six candidates for Corporate membership were elected. The following Trustees of Real Estate were elected: Harvey N. Shepard for four years, J. Rayner Edmands for three, Augustus E. Scott for two, and Charles E. Fay for one year.

Mrs. Ellen F. Adams, of Cambridge, presented an instructive and interesting paper on Hawaii. A long residence in the beautiful islands qualified the writer to present an accurate and faithful account of the climate, people, scenery, and society. Industrial conditions were explained, a brief political history given, and the ascent of Haleakala described. Unpleasant features were not omitted; and yet on the whole it was a charming description of a delightful life.

Several short accounts of the Winter Excursion to Jackson, N. H., were presented: Miss H. E. Freeman described the trip through Crawford Notch and the ascent of Mt. Willard; Miss Mary A. Furbish, the ascent of Thorn Mountain; Mrs. W. R. Davis, Black Mountain; and papers by W. B. Abbott on Carter Notch, and H. C. Parker on Mt. Washington, were read by the Recording Secretary. All the papers were bright and interesting, and gave an excellent idea of the delights of a winter excursion, snow-shoeing, and mountain climbing.

March 12, 1894. — Special Meeting. Held in Association Hall.

President Moxom in the chair.

Miss Eliza Ruhamah Scidmore, of Washington, D. C., gave an illustrated lecture on Korea. The trip across the continent and voyage across the Pacific were touched upon; the geographical position and the history of the peninsular country were given, and then followed an interesting description of the curious people and their many strange customs. The lecture was filled with information, and often relieved with bits of humor. About fifty lantern-views helped the audience to follow the descriptions and obtain more accurate ideas of this little-known country.

In introducing the lecturer the President alluded to her travels in Alaska and Japan, and to her great interest in the movement to establish a National Park at Mt. Rainier.

Some three hundred persons were present.

April 11, 1894. — One Hundred and Forty-sixth Corporate Meeting.

Ex-President William H. Niles in the chair.

In the absence of the President and Vice-President, Professor William H. Niles was elected chairman. Sixty persons were present. Twenty candidates for Corporate membership were elected.

Professor Fay announced that the Sella collection of photographs had been exhibited in Washington, was now on exhibition in Philadelphia, and would go thence to Brooklyn and New York.

Upon recommendation of the Corresponding Secretary, speaking in behalf of the Council, it was voted that the Appalachian Mountain Club express its sympathy with the bill now before Congress having in view the establishment of the Washington National Park, and that a Committee of three be appointed by the President to use such means as they may be able in support of the proposed bill. This Committee was instructed and empowered to communicate with one or more of the Honorary or Corresponding members of the Club resident in Washington, with the Senators and Representatives from New England, and to adopt such other measures as shall to them seem judicious in support of the bill as proposed.

Mr. J. Henry Blake gave an account of a two weeks' sojourn in the Straits of Magellan. Mr. Blake was Natural History draughtsman for the expedition which was led by Professor Louis Agassiz to the western coast of South America. The paper was filled with information descriptive of the scenery, natives, and geology of the region. The mountains — about 7,000 feet high — and forest near the west end were described, as also the animals, birds, flowers, shells, and seaweeds. Maps and diagrams were used in illustration.

Mr. Amadeus W. Grabau presented a paper entitled "The Gorges of the Genesee River." This was a geological study, and very instructive, as showing how a river cuts its way back through its valley. Views of the falls and gorges were thrown upon the screen, illustrating how the stream does its work. The Genesee is a younger brother of Niagara; the great difference between the two is in the volume of water.

May 9, 1894. — One Hundred and Forty-seventh Corporate Meeting.

President Moxom in the chair.

Eighty-five persons were present. Ten candidates for Corporate membership were elected.

Professor C. E. Fay, for the Committee appointed to secure additional legislation, reported that an Act had been passed by the General Court empowering the Club to hold real estate, and that under the law of New Hampshire the power was good in that State also. The Club is therefore prepared to acquire forest lands for scientific forestry and preservation in perpetuity.

The report was accepted.

Colonel T. W. Higginson presented a large and valuable herbarium of American ferns, bequeathed to the Club by the late E. H. Hitchings of Malden, who was a member of the Club in 1883-84. The collection comprises 146 species, and is mounted upon 300 sheets. Colonel Higginson called attention to many of the more interesting specimens. A Committee

consisting of Professor William H. Niles, Councillor of Natural History, Miss J. C. Clarke, and Miss M. A. J. Frothingham, was appointed to express to Miss Helen M. Hitchings, the daughter of the donor, the Club's grateful appreciation of the gift.

Mr. T. A. Jaggar, Jr., addressed the Club concerning "The New Timber Reserve of the Yellowstone Park." He called attention to the value of this region as the water supply of the Missouri and Snake rivers, described a three months' trip in the Absoraka region, and showed about sixty lantern illustrations of mountain scenery and camp life. Much interesting geological information was given.

June 13, 1894. — One Hundred and Forty-eighth Corporate Meeting.

Ex-President George C. Mann in the chair.

In the absence of the President and Vice-President, Mr. George C. Mann was invited to preside. Forty persons were present. Twenty-three candidates for Corporate membership were elected.

A paper on "The French Alps" by Mr. Warren Upham was read by Professor C. E. Fay. It was a careful review of a work recently published by Mr. Albert Falsan, of Lyons.

Mr. Leon S. Griswold presented a communication on "The Appalachian Mountains West of the Mississippi." He demonstrated that the short range of mountains in Arkansas and Indian Territory belongs to the Appalachian System, and showed their similarity to the Pennsylvania mountains in their linear ridges with sharp crests, in the cutting of streams across the ridges, in the folding and in the direction of pressure. He also described the scenery, people, fauna, and flora of the region.

July 2, 1894. — Twenty-ninth Field Meeting. Held at the Summit House, Mt. Washington, N. H.

Vice-President Herbert in the chair.

About seventy-five persons were present.

Professor C. H. Hitchcock spoke concerning "The Glacial Geology of the Summits of Mt. Washington and Neighboring Peaks." He believed that the summit of Mt. Washington was once covered by glacial ice, but that the ordinary marks of glacial action had been obliterated by the effects of weather. Erratic stones had been found on the high summit and striated quartz ledges in the col between Adams and Jefferson. Washington is the highest glaciated summit in the East. He also spoke of the great ice sheet of the Laurentian Highlands, and of the minor glaciers radiating from mountain peaks. In regard to the solid geology of the region he called attention to the different kinds of rocks, at Mt. Washington, among the Franconia Mountains, and in the region between. From the Twins to Chocorua the rock is newer.

Messrs. Mann and Lawrence, of the Committee in charge of the excursion, gave notices concerning plans proposed for the week.

Mr. S. H. Scudder spoke concerning the insects stranded on the high peaks after the retreat of the ice. His subject was, "The Effect of the Glacial Epoch on the Insect and Plant Life of the Mountains." Compared with the Alps, Himalayas, and northern lands, the White Mountains have but few alpine insects. The *Ceneis semidea* was the only true alpine butterfly he had been able to find. He described this insect and its habits so far as known, and exhibited illustrations and a specimen. He also described the sub-alpine butterfly, *Brenthis montinus*, and the sub-alpine grasshopper, *Pezotellix glacialis*.

The Recording Secretary then read a paper by Mr. J. Rayner Edmonds, describing the new "Gulf-side Route," leading from Randolph to the summit of Mt. Washington. The part along the upper portion of the Ravine of the Castles from Israel's Ridge to the col between Adams and Jefferson, and the part along the east side of Jefferson have already been built by Mr. Edmonds. The paper also advocated the use of cairns in place of paint trails.

On Thursday evening another meeting was held; Mr. George C. Mann in the chair.

Professor Hitchcock described Maidstone Cave in Vermont. This is not the ordinary kind of cave formed by erosion in limestone, but represents a break in the mountain since the ice age. Unlike the Flume, the fissure was never filled by eruptive rock.

Mr. Harvey N. Shepard announced the meeting of the American Forestry Congress, and their excursion with the Forestry Commissioners of New Hampshire through the White Mountains, August 24-27. An invitation was extended to the Club to be represented by a speaker. It was voted that the Trustees of Real Estate take such action as may seem for the best interest of the Club.

Notices of excursions were given by the Committee.

The following resolution was passed: In recognition of the successful efforts of the management of the Summit House, whereby our pleasure, comfort, and convenience have been increased, we, the members of the Appalachian Mountain Club, desire hereby to extend to Mr. C. H. Merrill, Miss Clarke, and the other members of the executive staff of the Summit House, a hearty vote of thanks.

Mr. Mann gave reminiscences of early trips to Mt. Washington.

Mr. R. F. Curtis spoke in an appreciative manner of the great interest taken in the Club by our late member, Mr. Charles H. Hardwick, and of his valuable services as a member of the Excursion Committee.

Mr. Scudder gave further information concerning the *Ceneis semidea* and other alpine insects; and the meeting closed with an informal talk by Mr. T. O. Fuller and others on botanical subjects.

October 17, 1894. — One Hundred and Forty-ninth Corporate Meeting.

Vice-President Herbert in the chair.

Seventy persons were present. Thirty-four candidates for Corporate membership were elected.

It was voted that the President be requested to appoint at the November meeting a Committee to Nominate Officers for next year, a Committee to arrange the Annual Reception, and a Committee to audit the accounts of the Treasurer.

Dr. John Baptist Blake addressed the Club concerning "Vienna and the Austrian Tourists' Club." After alluding briefly to the interesting history and beautiful architecture of the city, the speaker described the topography of the surrounding country and of the mountain region about the Semmering Pass, a paradise of climbers. He then told of the Tourist Club, of its rooms and library, and described its mountain work, the building of paths, huts, hotels, and the publication of maps.

Miss Lucy A. Putnam presented a short paper on her visit to Darjeeling (see p. 309). The journey from Calcutta, and the climate of India's great summer resort were described; and the paper closed with a fine description of Kinchinjanga seen in the midst of night, but with the daybreak upon its snows.

November 14, 1894. — One Hundred and Fiftieth Corporate Meeting.

Vice-President Herbert in the chair.

Ninety persons were present. Twenty-one candidates for Corporate membership were elected.

The Committees, appointed by the President, Dr. Moxom, were announced by the Recording Secretary, as finally made up. They were the following: Committee on Nominations, — George C. Mann, James R. Carret, Frederic D. Allen, Miss J. C. Clarke, Miss Lizzie D. Lincoln; Committee on Annual Reception, — John Ritchie, Jr., Parker B. Field, William S. Rumrill, Miss Mary Alba Webster, Miss M. A. Knowles, Miss Clara J. Bates; Committee to audit accounts, — Isaac Y. Chubbuck, Charles W. Kennard, Charles H. French.

Mr. Henry Bailly presented a paper describing a "Week in Western North Carolina." Attractions along the route from Philadelphia to Linville were mentioned, the work of the Linville Improvement Company in establishing a mountain resort was explained, but the bulk of the paper was taken up with descriptions of the three principal excursions from Linville, — the ascent of Grandfather Mountain on foot, the ride to Linville Falls on horseback, and the drive to Blowing Rock by tallyho.

Mr. John Fretwell described a trip to Newfoundland, Labrador, and Louisbourg. A large number of lantern illustrations were shown. Political and economic conditions and physical features of the islands were

described, and incidents given showing the character and habits of the people. The views were very interesting: Sidney, the magnificent harbor of St. John, many other harbors, fishing-hamlets, and especially icebergs.

December 12, 1894. — One Hundred and Fifty-first Corporate Meeting.

Ex-President Rest F. Curtis in the chair.

In the absence of the President and Vice-President, Mr. Curtis was elected chairman *pro tem*. One hundred and twenty persons were present. Twelve candidates for Corporate membership were elected.

The evening was devoted to the enjoyment of reminiscences of the Mt. Washington Field Meeting of July last. The Chairman of the Committee, Mr. George C. Mann, gave an outline of the week, with statistics, description of weather, and allusions to the various trips made. Miss Hannah M. Todd read a paper (see p. 323) by Miss Zilpha D. Smith, describing the trip over the northern range, with one night spent at the Madison Spring Hut, and another at the Cascade Camp; Miss Charlotte M. Endicott, another describing the trip to Tuckerman's Ravine and the Snow Arch, with many allusions to alpine flowers. Mr. F. O. Carpenter described the view in Huntington's Ravine and the climb to the Summit. Miss O. F. Dabney spoke of the Crawford Path and the heavy shower experienced on Mt. Clinton. A large number of lantern-views were shown by Mr. Parker B. Field, and a few by Mr. Frederic Endicott; many of them being photographs taken on the various excursions. The pictures and the papers recalled many pleasant incidents, and were thoroughly enjoyed by the large number present.

December 19, 1894. — Special Meeting.

Vice-President Herbert in the chair.

One hundred and seventy persons were present.

"A Week among the Selkirks and Canadian Rockies" was the subject of an informal talk by Professor C. E. Fay and Mr. R. F. Curtis. Mr. Fay began by speaking of the early part of their trip in Southern California, and through the Pacific States to Vancouver and up the Cañon of the Frazer River, and gave a general description of the Selkirk region. Mr. Curtis followed with a detailed account of the ascent of Mt. Abbott (see p. 292) and the grand views of Sir Donald, and the many other peaks and glaciers in the view. Mr. Fay then gave a vivid and very interesting description of their attempt to scale Eagle Peak, and of the night spent on the rocks high above timber-line (see p. 297). A hurried and not quite complete ascent of Mt. Stephen was then recounted by Mr. Curtis, and the lakes near Laggan were left to be described at some future meeting. The grand scenery of peaks and glaciers was illustrated by many stereopticon views, and information was given showing the possibility of a Club excursion to the region in August, 1895.

January 9, 1895. — One Hundred and Fifty-second Corporate (Annual) Meeting.

President Moxom in the chair.

One hundred and five persons were present. Seven candidates for Corporate membership were elected.

The Councillor of Natural History, Professor William H. Niles, presented his report. The other Councillors were absent.

The annual reports of the Recording and Corresponding Secretaries, Treasurer, Auditors, Trustees of the Permanent and Reserve Funds, and Trustees of Real Estate were presented. It was voted that the various reports be accepted. For the several reports, see APPALACHIA, Vol. VII. No. 4.

Mr. George C. Mann, chairman of the Committee on the Nomination of Officers for 1895, made the following report: For President, Edward Everett Hale; Vice-President, Albert S. Parsons; Recording Secretary, Rosewell B. Lawrence; Corresponding Secretary, John Ritchie, Jr.; Treasurer, John E. Alden; Councillor of Natural History, William H. Niles; Councillor of Topography, Louis F. Cutter; Councillor of Art, Rose Hollingsworth; Councillor of Exploration, Parker B. Field; Councillor of Improvements, Frederic Endicott; Trustee of the Permanent and Reserve Funds (for three years), Rest F. Curtis; Trustee of Real Estate (for four years), Charles E. Fay.

On motion of Mr. Mann, in behalf of the Committee, it was voted that a committee of five members be appointed annually by the President, at the October meeting, to present a list of candidates for officers of the Club, to be voted for at the Annual Meeting in January. The names of the Nominating Committee shall be announced on the notice of the November meeting, with a request for suggestions for nominations from members of the Club. The list of candidates nominated by the Committee shall be published on the notice for the Annual Meeting.

On motion of Professor C. E. Fay, it was voted to request the Council to consider the expediency of presenting upon the call for the next meeting an amendment to the By-laws changing the Department of Exploration to Department of Forestry.

The report of the Excursion Committee in detail was presented by the chairman, Mr. R. F. Curtis.

The balloting for officers resulted in the unanimous election of the candidates nominated. In retiring from the chair Dr. Moxom briefly addressed the Club, and then introduced the newly elected Vice-President, Mr. Albert S. Parsons, the President-elect, Dr. Edward Everett Hale, not being present.

Mr. Albert White Vorse, a member of the Peary Relief Expedition, described the scenery of Southern Greenland, including glaciers and mountains (see p. 315). His remarks were illustrated with lantern views.

There were on exhibition at the meeting some very fine photographs taken at Zermatt the past season by Dr. Harry Fielding Reid, of Baltimore, who also ascended the Matterhorn.

January 16, 1895. — Special Meeting.

Vice-President Parsons in the chair.

One hundred and thirty-five persons were present.

Mr. Henry G. Peabody delivered his illustrated lecture, "Ten Days in the White Mountains." The trip embraced the Merrimac Valley and Lake Winnepesaukee, Franconia Notch, Bethlehem, the ascent of Mt. Washington, Tuckerman's Ravine and the Great Gulf, Carter Notch and the ascent of Wildcat, Randolph, Jefferson, Crawford Notch and Mt. Willard, Jackson, the Intervale, and Mt. Chocorua. The views thrown upon the screen were very fine, particularly those of Chocorua and the cloud-views on Mt. Washington.

February 13, 1895. — One Hundred and Fifty-third Corporate Meeting.

Vice-President Parsons in the chair.

Ninety-five persons were present. Six candidates for Corporate membership were elected.

The Secretary reported that the Council had voted it inexpedient to change the title of Councillor of Exploration to Councillor of Forestry.

Professor William H. Niles gave the Club a review of Professor Joseph Le Conte's address upon "Theories of Mountain Chains." The varied material accumulated upon this subject was collated and discussed by Professor Le Conte so well that the attention of the Club should be called to it. Theories must be deduced from a study of the structure of mountains. We find that mountains have been formed where the deposits of sediments are thickest and coarsest along the shores of continents. Folded structure is then discussed, the Appalachian chain being typical; also cleavage, metamorphic or granitic axis, symmetry and faulting. After examining the various theories advanced, formal and physical, with arguments for and against each, he concludes that the contractional is the best working hypothesis we have as yet.

Mr. Percival Lowell addressed the Club concerning the mountains of Mars. Strictly speaking, there are none; but on the terminator have been detected rounded elevations and long ridges from 2000 feet to possibly a mile in elevation.

President Hale, who appeared during the meeting, spoke a few words concerning the mountains of Mars.

March 12, 1895. — One Hundred and Fifty-fourth Corporate Meeting.

Vice-President Parsons in the chair.

One hundred and thirty-five persons were present. Five candidates for Corporate membership were elected.

The Chairman of the Trustees of Real Estate, Mr. Shepard, announced that the subscription, exclusive of the contribution from the Club treasury, amounted at present to about four hundred dollars, and expressed the hope that more members would contribute, small amounts as well as large being welcome.

Mr. Samuel E. S. Allen, of Philadelphia, presented a paper entitled "An Ascent of Mt. Temple, in the Canadian Rockies" (see p. 281). The speaker also described many other ascents made by him and his friends during the past few years, not only in the Rockies but in the Selkirks, and notably that of Mt. Cheops. He discussed the names of Mts. Temple and Lefroy, and gave some of the results of his own surveys. One hundred and seventy-five lantern slides were shown; a remarkable collection of views of beautiful lakes, including Lake Louise, of grand glaciers, including the Illiciliwaet and Dawson, and of many rocky peaks taken at very high altitudes. The speaker also alluded to interesting sections of the mountains not yet explored.

Professor C. E. Fay added a few remarks concerning the beauty and grandeur of the region, and said that Mr. Allen's paper, dealing so fully with the Lake Louise region, rendered unnecessary any promised sequel to the December meeting.

April 12, 1895. — One Hundred and Fifty-fifth Corporate Meeting.

Vice-President Parsons in the chair.

Eighty-five persons were present. Eight candidates for Corporate membership were elected.

The Chairman addressed the meeting concerning the expedition to bring back Lieutenant Peary from the Arctic regions, and stated that while Mrs. Peary would be glad to have our Club represented in the expedition, the Council did not feel that the Club had money for the purpose. Any assistance from members would, however, be gladly received. The Chairman also referred to Dr. Cook's Antarctic expedition.

Professor W. H. Niles invited the members to the next meeting of the Natural History Society to hear Professor William Libby give an account of his two months in Greenland.

The remainder of the evening was devoted to the rivers and lakes of British Columbia. Mr. Robert E. Strahorn presented a paper concerning the region about Harrison and Douglas Lakes and Frazer River, gave incidents of his boating and camping experiences, and described the Indians and their Passion Play.

Mr. J. F. Collom spoke about the Kootenai River and Lake, and alluded to the ores found in the region. Both papers were finely illustrated.

Members added since January, 1894.

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Diller, Joseph S., Washington, D. C.	Kirchhoff, A., Halle am Saale, Germany.
Hann, Julius, Vienna, Austria.	LeConte, Joseph, Berkeley, Cal.
Hayes, C. Willard, Washington, D. C.	Reclus, Élisée, Paris, France.
Heilprin, Angelo, Philadelphia, Pa.	Walker, J. B., Concord, N. H.
	Whympier, Edward, London, Eng.

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Bent, Allen H., Roxbury.	Cox, John W., Melrose Highlands.
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Brown, Wilbur C., Boston.	Eichorn, Miss Mary A., Boston.
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Bull, Miss Harriet E., Buffalo, N. Y.	Ellis, Miss Helen L., Newton Centre.

Ellis, S. Clarence, Boston.
 Elson, Mrs. Geo. H., Roxbury.
 Evans, George W., Dorchester.
 Evans, Mrs. George W., Dorchester.
 Farrar, Miss Lillian K. P., Newton Centre.
 Fearing, Andrew C., Jr., Boston.
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 Gilbert, Shepard D., Salem.
 Gilbert, Mrs. Shepard D., Salem.
 Goldthwait, Miss Emily H., Lynn.
 Gray, Miss Alice M., Dorchester.
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 Holder, Miss Leila W., Lynn.
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 MacDonald, Ronald, North Abington.
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 Manning, Mrs. Warren H., Brookline.
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 Maynard, Samuel T., Amherst.
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Newhall, C. A., Dorchester.
 Newhall, Miss Hattie C., Lynn.
 Ormsby, Miss Blanche L., Roxbury.
 Ormsby, Henry S., Roxbury.
 Osborne, George R., Cambridge.
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 Pead, John W., Lowell.
 Penfield, James A., Boston.
 Penfield, Mrs. James A., Boston.
 Pierce, Miss Adelaide, Chelsea.
 Pierce, Miss Mary E., Dorchester.
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 PORTER, MISS JULIET,¹ Worcester.
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 Topliff, George F., Boston.
 Trant, Miss Amelia E., Buffalo, N. Y.
 UNDERHILL, MRS. ELIZA P.,¹ Lowell.

¹ Life Member.

Vinton, Miss Mary I., Cambridge.	White, Henry, Cambridge.
Vorse, Albert White, Boston.	White, Mrs. Henry, Cambridge.
Ware, Robert A., Boston.	Wiggin, George W., Franklin.
Washburn, Rufus A., Boston.	Wight, Freeman C., Boston.
Watson, Miss Gertrude L., Magnolia.	Williams, Miss Carrie M., Cambridge.
Wells, Amos R., Auburndale.	WILLIAMS, JOHN D., ¹ Boston.
Wells, Mrs. Amos R., Auburndale.	Williams, Norman, Chicago, Ill.
Wentworth, William H., Cambridge.	Woodbury, William R., Boston.
Weston, Robert S., Brockton.	Yerxa, Miss Sarah D., North Cambridge.

¹ Life Member.

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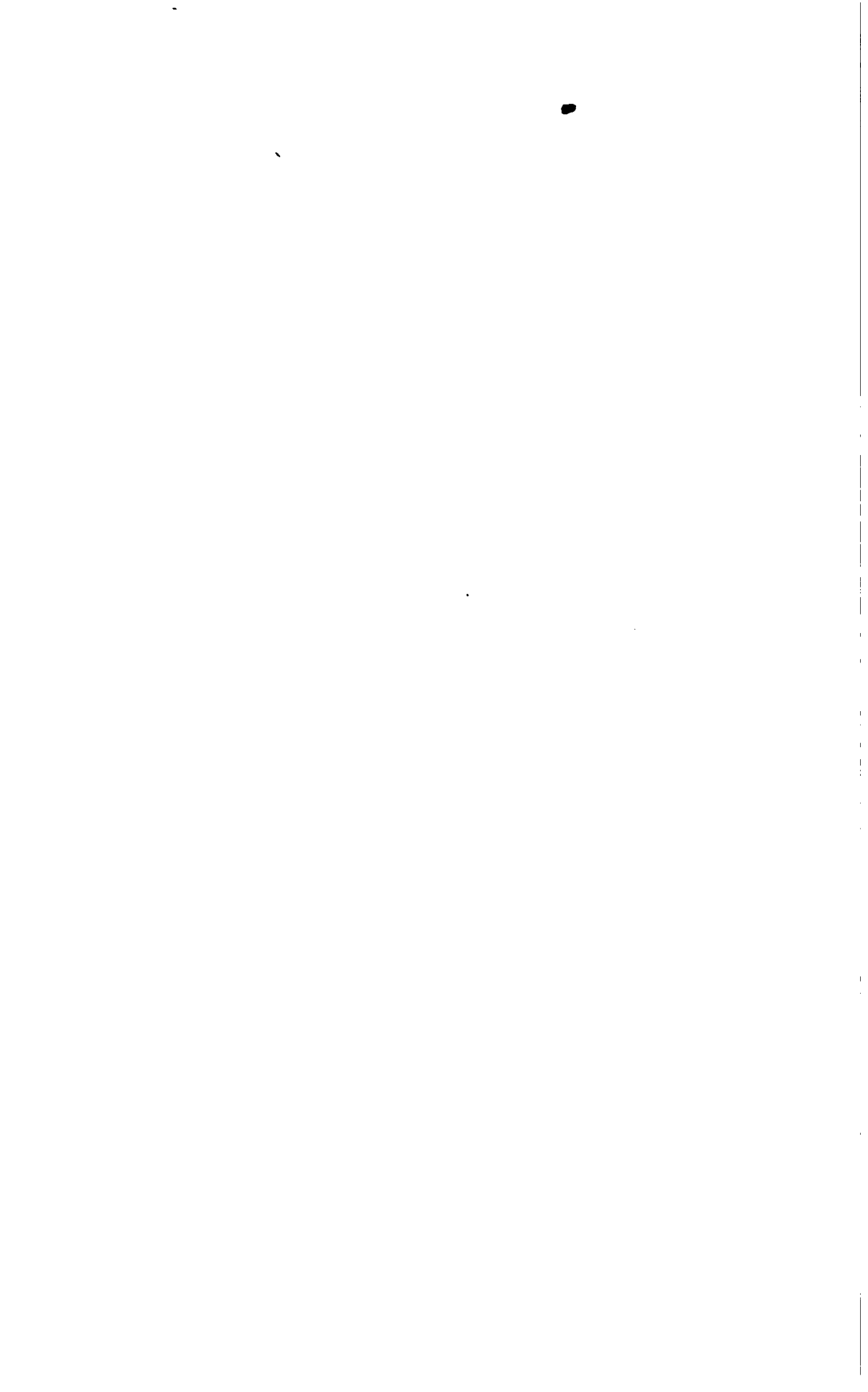
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